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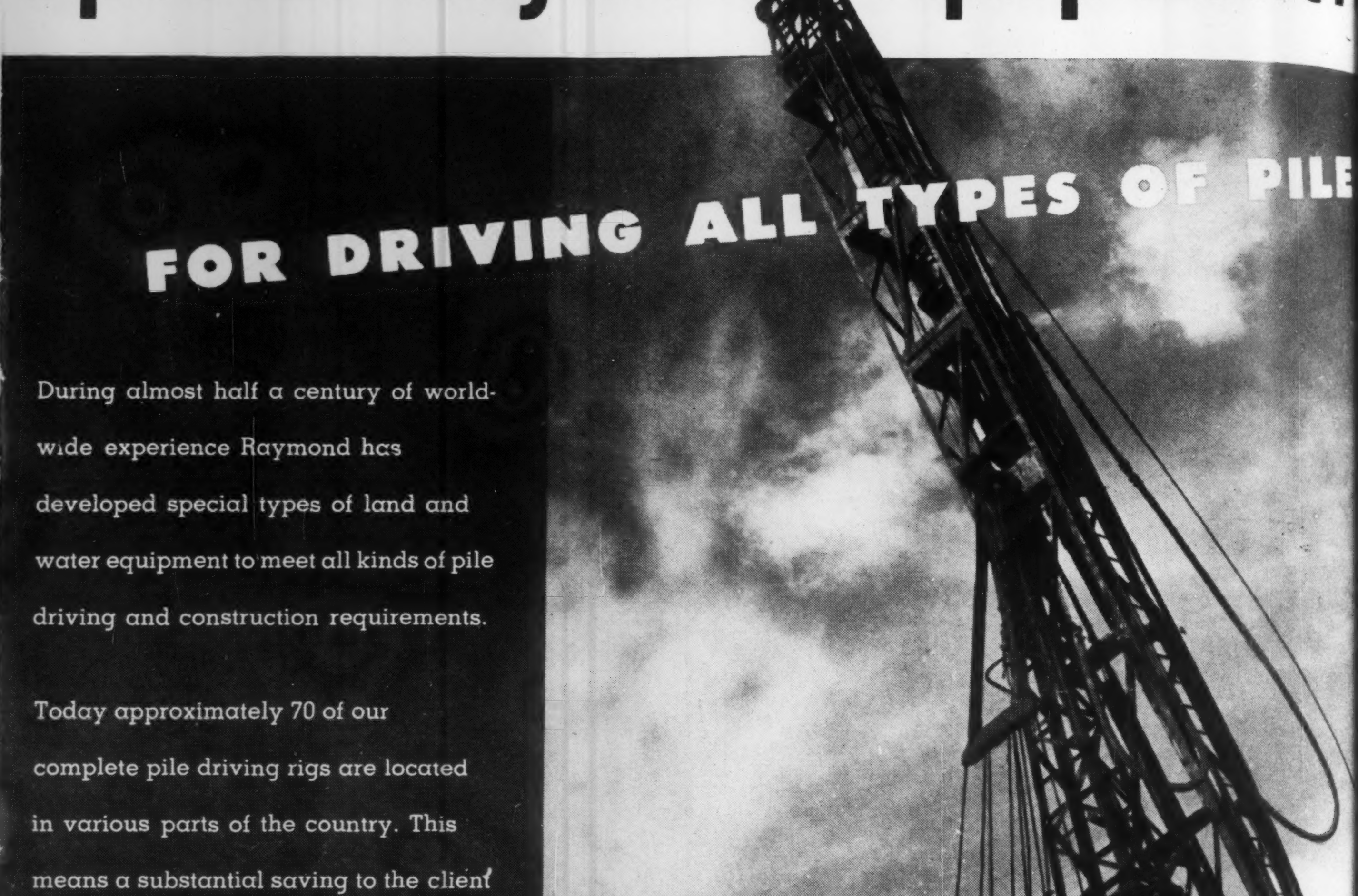

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Among Our Writers

H. S. Aurand in 1941–1942 headed the Defense Aid Div. of the War Dept., then the Sixth Service Command. In 1944 he was sent to the European Theater and became Commanding Gen., Normandy Base Section until V-E Day. His present assignment as Director of Research and Development, War Dept. Gen. Staff, is to mobilize science and engineering in both peace and war.

Leonard A. Bergman (Carnegie Inst. of Tech., B.S. C.E. '13), following service in the U.S. Engineers in World War I, has been director of water for Buffalo, N.Y.; utilities engr., Bluebonnet Ordnance Plant, McGregor, Tex.; director of buildings for Buffalo, N.Y.; and beginning in 1946, director, Bur. of Planning, Dept. of Commerce, New York State.

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Malcolm Elliott was in government service for about 40 years. He directed (1920–1946) navigation and flood-control projects of the Army Engineers, and served on the Miss. River Commission. He was awarded the D.S.M. for executing a large construction program in World War II. Since retirement in 1946 he has been senior member of Elliott and Porter.

Lorenz G. Straub (U. of Ill., B.S. '23, M.S. '24, Ph.D. '27, C.E. '30) was the first ASCE Freeman Traveling Scholar in Europe, 1927–1929. He is now head of the civil engineering dept., U. of Minn., and director of St. Anthony Falls Hydraulic Lab. In World War II, he coordinated engineering research in undersea warfare and rocket weapons.

J. F. Friedkin (Tex. Col. of Mines '32) during the war served in the Corps of Engineers, U.S.A., assigned to the Miss. River Commission, on studies of the Lower Mississippi. He has resumed his duties with the International Boundary and Water Commission, at San Diego, Calif.

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Lawrence B. Feagin (Vanderbilt U., B.A. '22; M.I.T., S.B. '24) has spent 22 years with the U.S. Engr. Dept. on the Tennessee, Cumberland, and Mississippi rivers, becoming head engr. During the war, he was a colonel in the Corps of Engineers, and for 4 years Dist. Engr., St. Louis Dist. He recently returned to his former position of head engr. in that District.

Charles E. Wuerpel has been with the U.S. Engr. Dept. since 1928. Since 1936 he has been responsible for research on concrete for the Department at West Point and Mt. Vernon, N.Y. Recently he became chief, Concrete Research Div., U.S. Waterways Experiment Station.

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In This Issue

Times Call for Mobilization of Engineers and Scientists . 475
H. S. Aurand

New York State to Build Highways Through Cities as Check on Decentralization 477
Leonard A. Bergman

Owner-Operator Cooperation Essential to Maximum Use of Airport Facilities 478
E. H. Sittner

Professional Bargaining Units Form National Organization 480

Local Sections Have Responsibility in Solving Professional Problems 481
W. W. Horner

Shield Used in Rock Tunnel Where Hazards Are Unusual 482
Howard L. King

States Build Reserve Shelf of Public Works 486
Philip B. Fleming

River Navigation Extended by Open-Channel Expedients

I. Characteristics of Rivers Permitting Open-Channel Methods 489
Malcolm Elliott

II. Discharge and Sediment Relationships in an Open Channel 490
Lorenz G. Straub

III. Alinement Affects Length, Depth, and Stability of Channel 491
J. F. Friedkin

IV. Soil Characteristics of Bed and Banks Determine Improvements 492
Charles Senour

V. Navigation Channels Developed by Contraction Works . . 493
Delbert B. Freeman

VI. Dredging Methods Compared 494
Lawrence B. Feagin

Addition of Air-Entraining Agent at Concrete Mixer Advocated 496
Charles E. Wuerpel

Reclaimed Sewage to Replace Ground Water in Los Angeles Area 498

Our Readers Say 499

Society Affairs 500

About Engineers and Engineering 519

News of Engineers 521

Deceased 14

Changes in Membership Grades 16, 18

Applications for Admission and Transfer 18, 20

Recent Books 20

Engineering Societies Personnel Service, Inc. 22, 24

Current Periodical Literature 24, 26, 28, 30, 32

Equipment, Materials and Methods 34, 36, 38, 40, 42

Index to Advertisers 48

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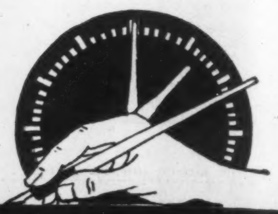

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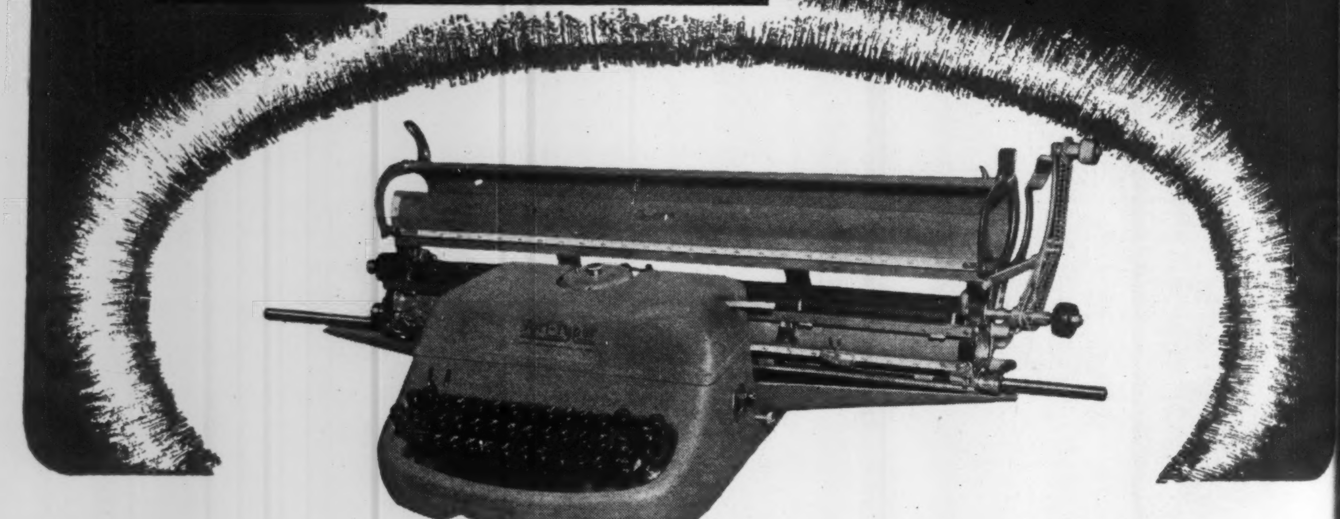

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Times Call for Mobilization of Engineers and Scientists

By H. S. Aurand

Major General, U.S. Army; Director of Research and Development, War Department General Staff, Washington, D.C.

Needs of common defense necessitate the immediate application of basic research to military methods, and the engineering of industrial capacity and communication lines should be based on military needs, according to the analysis of General Aurand, which was presented to the Kansas City meeting of ASCE. Engineers and their organizations are called upon to give prime attention to problems of national security.

In the two World Wars the engineer has applied himself, both on and off the battlefield, to a degree never before recorded in the history of warfare. The change that occurred in these wars was perhaps greater off the battlefield than on, although the Army Chief of Engineers might well take exception to this statement. But I wish to discuss here the engineer off the battlefield because it is in the period after World War II, when no battles are being fought, that the engineer must readjust his thinking to the conditions with which he is faced.

CALLED ON FOR CONVERSION

Prior to World War I, the engineering activities that applied the scientific knowledge of our country to the military art were largely conducted by men in uniform or by civilian employees of the Armed Forces. During World War I, it became necessary to utilize a great proportion of our industrial capacity for the manufacture of munitions. The engineer was called in to make this conversion.

In the period between World War I and World War II, those in the military service, who had previously engineered the production of military equipment, went to industry and the industrial engineer for the purpose of planning industrial mobilization. The lesson of World War I had been learned and was applied in World War II, when, through our engineering skill, we became in truth and in fact the "Arsenal of Democracy."

BASIC RESEARCH NEGLECTED

World War II brought the scientist and his laboratory into almost complete mobilization in the interest of national security. However, scientists themselves believe that practically none of the basic research done during World War II was utilized in its conduct or made available on the battlefield. That is, the same thing happened to basic scientific research in World War II as happened to industrial production in World War I. It arrived too late. Consequently, there are two problems before the engineer at the moment. The first of these is to make the military application of the basic scientific information discovered during World War II to our national security; and the second is to arrange that, in the event of a future emergency, scientific information can be given military application in a very much shorter time.

Since these are the two ideas I would like to stress, let me restate them in another form. Our country requires the immediate service of all types of engineers to apply a large body of scientific information to the needs of our common defense. The country also needs a mobilization plan for scientists and engineers, as effective as was our industrial mobilization planning for World War II, in order that new scientific information may reach the battlefield in the form of new equipment in the shortest possible time.

Maj. Gen. H. S. Aurand

There is also a negative, or defensive idea, which must be kept in mind. The implements of modern warfare are not only fast, but they are extremely, and sometimes subtly, destructive. Up to the present time, short of going underground in air-conditioned establishments, dispersion over great areas may be the only way to prevent a knockout blow being given to our nation at the outset of a future war. Perhaps these negative concepts are more important in the engineer's day-by-day thinking than are the positive ones I have already stated. In order to illustrate what the engineer may be called upon to think when engaged in his tasks in the near future, consider the solution of a hypothetical problem. It has to do with the steel industry. It could be applied to any other.

The steel industry already is well established in the Pittsburgh, Chicago, and Birmingham areas, as well

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"We Must Not Only Not Be Surpassed, We Must Stay Ahead"

as elsewhere. It has not as yet reached its full growth. In planning the growth of this industry, or the adaptation of new scientific discoveries to it, the engineer should consider the national necessity of having these three areas not only completely independent, but also so arranged that each can produce all the products that any one can produce. This is an illustration of the negative or defensive concept which the engineer might apply.

Such considerations are as important locally as they are on a national scale. They apply perhaps with greater emphasis to means of transportation and communication than they do to single integrated industries of our productive capacity. Alternate routes, alternate kinds of transportation, and alternate kinds of communication are a national necessity.

CIVILIAN AID NEEDED

On the positive side, there is no need for hypothetical illustrations of what the engineer may do in the next few years. The need of the Armed Forces for the application of existing scientific knowledge to military equipment is at the moment tremendous. The work is so great that it can no longer be done by the engineering personnel of the Armed Forces, whether in uniform or in civilian clothes; nor perhaps can the national budget bear the burden of these applications. The Armed Forces are asking for outstanding engineers to serve on advisory panels and committees on a basis that will permit of reasonable payment for the time they will devote to the Government. They are inviting engineering societies to undertake the solution of national defense problems. They are making contracts with engineering firms for the application of scientific information in the development of military equipment. The demand for trained engineers has perhaps never been greater in the history of our country. It is incumbent upon each engineer to determine for himself, and upon each engineering society to determine for itself, the extent of participation in those engineering problems that have to do with the national security.

There is another new concept also that I would like to leave in the minds of engineers. I have emphasized the role of the engineer off the battlefield because that is his position in time of peace. However, when the shooting starts, the engineer in civilian clothes will no longer be a stay-at-home. New devices, if created promptly from available scientific information, will have to be put into the battle. These devices will not be simple; and troops, whether on the ground, in the air, or on the sea, will have to be taught their application in combat. The scientist and the engineer must be there to give this instruction. The tactical side of the Army is accepting this fact and is obtaining the assistance of the engineers, particularly in the conduct of tests of equipment and in the instruction of troops in the operation of equipment that has just come from the laboratory.

The more complex the modern devices of the battlefield become, the greater is the requirement for transportation of all types—land, sea and air, rail and long-distance trucking. Likewise the stockpiling and handling of materials require all sorts of handling equipment, which must exist in all kinds of places, in every variety of climatic conditions. By and large, these are civilian items of equipment about which there is considerable experience of use in civilian life, but the application to military use is no more simple than are the devices used on the battlefield. The establishment of a military line of communications is a military task requiring the greatest resourcefulness. The need for the engineer in the next war—on the battlefield and along the lines of communication behind it—will be greater than ever before.

On the next higher level—on the level of the strategist, of the Chief of Staff, of those responsible for the overall conduct of military operations—the advice and assistance of engineers will be required not only in connection with the utilization or employment of new weapons, or the possibility of new military applications of scientific knowledge, but also in the actual planning of the military campaign. We are already familiar with the need for the engineer to increase productive capacity, to convert existing production in time of war. Yet the need for the engineer will be even greater when war comes again because the time element will be far more rigorous. Speed will be the watchword more than ever before.

So, in the face of changing national and international conditions—in the "changing social order," if you will—for the next few years the engineer should bear in mind, on the negative side, those factors that will insure the national security in the face of a violent initial surprise attack, which may herald the beginning of World War III. On the positive side, he should contribute a part of his time and his society's time to the engineering problems facing those charged with national defense, particularly in the field of applying the great bulk of available scientific knowledge to the creation of implements of war. He should also bear in mind that he must remain ready for a prompt and speedy scientific and engineering mobilization.

MUST DECREASE TIME LAG

Toward the securing of both these ends, he should urge his society to set up a separate body for the consideration of national security problems and to join with other societies for the same purpose. His efforts should constantly be to decrease the time lag between the availability of scientific information and its useful application. Practice in this in the fields of peace will certainly lessen the time of bringing new implements to the fields of battle.

Within the capabilities and limitations of personnel and funds, the Armed Forces will lay before the engineers and their societies specific engineering tasks that they may accomplish. In this connection my office, the Research and Development Division of the War Department General Staff, will be only too happy to collaborate. The engineer's task in national security is no longer a task for the military alone.

The survival of our democratic idea, our concept of a Bill of Rights, and our way of life no longer rest upon the military forces, but upon the engineer's assistance and insistence in the solution of military engineering problems. The scientists and the engineers of other nations are making a supreme effort to place the military potential of their respective countries at the top. We must not only not be surpassed, we must stay ahead. Whether we do so or not is largely the responsibility of the civilian engineer.

New York State to Build Highways Through Cities as Check on Decentralization

By Leonard A. Bergman

Director, Bureau of Planning, New York State Department of Commerce, Albany, N.Y.

In the re-planning of cities to check disintegration of downtown areas, to arrest decentralization and to preserve property values, one of the important new measures is the assumption by the State of New York of the costs of design and construction of arterial highways in the cities of the state. The expense of this construction, which in the past made it prohibitive for some communities to undertake the task, will be shouldered by the state. This step has been taken in recognition of the part transportation plays in stabilizing urban areas.

The effect of widespread migration to the suburbs and environs has a debilitating effect on the central city. It tends to decrease the demand for properties and hence to lower values to produce a lower tax base, and eventually to raise taxes to meet operating costs and debt requirements. The downtown high-value business district and civic center maintain a prosperous facade, but not far away are large areas for which there seems to be no use. Much of the land may be vacant, the former buildings having been demolished because they were no longer profitable or were structurally unsound or obsolescent.

If disintegration of present downtown areas is to be checked, it is obvious that local transportation facilities must be more thoroughly understood and greatly improved. If its major purpose is to provide the opportunity for convenient personal contact for business, social, and cultural pursuits, the downtown area must be made more easily accessible. Although many improvements in the control of traffic, street widening and parking facilities have been made, the capacity of the local street system for faster and safer movement is woefully inadequate. All too often it takes longer to go from the fringes of a city to its downtown area than to drive to points 25 or 30 miles beyond.

Construction of necessary arteries to alleviate such conditions at strictly local expense might increase real estate tax loads to such an extent as to drive away the business they were designed to save. Equally ominous results loom up if the problem is ignored.

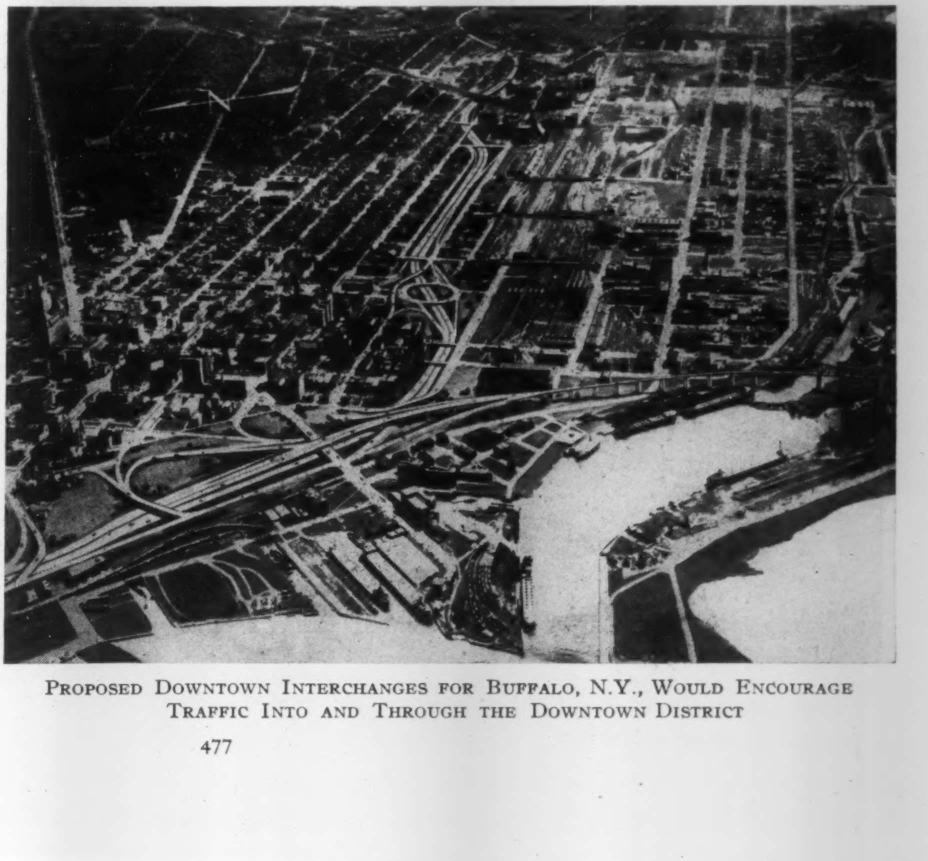
The State of New York recognizes the problem and has taken remedial measures. By its action enabling construction of major routes at State expense in urban centers, the State Legislature has relieved the local taxpayer of the fiscal nightmare which had been staring him in the face.

These routes will be designed not merely to improve pavement surface or to increase street widths. In some cases, entirely new routes will be required. Each will be tailor-made to fit the needs of the particular community concerned. After thorough local studies have been made and plans submitted to local authorities and received general approval, the various projects will be progressed as men, money, and materials are available. The only local cost will be for 50% of whatever right-of-way will be required. The State will pay the rest. In many instances these urban arterial routes and their downtown interchanges will occupy, and bring about new uses of, existing blighted and decadent areas.

Although urban arterial routes will greatly facilitate and speed up traffic movement to and from downtown areas, cities are faced with another problem—that of parking on the already overburdened streets in the business district. There are limitations, both physical and fiscal, to widening pavements to provide this convenience and increase the capacity for movement of traffic. Off-street parking facilities in garages and in parking lots have not as yet lessened curb parking. We all know what a task it is to find a spot.

Curb parking is of great convenience to the motoring public but the time is rapidly approaching when the entire width of the pavement area must be utilized for movement of traffic and not for storage of vehicles. We cannot continue indefinitely to make garages of our public streets. Informed thinking on the problem points to the urgent necessity, in urban centers, of providing off-street storage facilities for automobiles. It may be that cities will face the necessity of providing these off-street facilities by building quarters on a self-liquidating basis, as has been done in San Francisco and other places.

Editor's Note: This article has been prepared from a paper presented before the City Planning Division at Kansas City.



Proposed Downtown Interchanges for Buffalo, N.Y., Would Encourage Traffic Into and Through the Downtown District

Owner-Operator Cooperation Essential to Maximum Use of Airport Facilities

By E. H. Sittner

Director of Functional Engineering, Transcontinental and Western Air, Inc., Kansas City, Mo.

TO assure an airport program satisfactory both to scheduled airline operators and to airport owners, fullest cooperation in the provision and use of facilities must be achieved. This cooperation must extend beyond the airports used by scheduled operators and include all the fields, regardless of classification, within the community served. The obvious reason for this integration of all the landing fields in a community is their interdependence in accommodating, combining, and segregating various classes of air traffic.

Operators as well as owners are vitally concerned with such basic factors in the provision of ground facilities as the location of the airport, its surroundings, its capacity, and its facilities.

TERMINAL FACILITIES EXAMINED

It is this last item, the provision of adequate facilities, that often poses a very knotty problem. Engineers have found that when complete information from all airline operators is available, substantial savings can be effected by consolidating certain utilities. The major basis for determining the size of terminal facilities is the estimate of aircraft traffic. However, a check list should be prepared itemizing each and every activity or need for which building space is required.

Airline operators should be requested to furnish estimates of the space needed for their functions and for the handling of mail, express, and freight. Officials of the Post Office Department and the Railway Express Agency will be glad to cooperate. Business houses desiring representation and other concessionaires should be canvassed, as should governmental agencies such as the CAA. To these totals must be added space for airport management, public lobbies, toilets, and facilities for handling the sightseeing public. Provision must also be made for adequate and free-flowing access roads, car-parking areas, truck-loading facilities, concession buildings external to the main building, and general beautification of the area.

TWO TERMINAL PLANS

There are, essentially, two major philosophies for the functional design of terminal buildings. In the so-called centralized plan, all passengers enter the main building through a central entrance. After being ticketed and checked in, they proceed to their respective plane gates. In order to provide weather shelter for passengers, a narrow apron building should be included, the roof of which constitutes an admirable spectators' gallery. Such spectators' facilities provide an excellent source of revenue. Obviously, at 150 ft per airplane position, walking distances soon become excessive. While there is no conclusive evidence to support the contention, it appears that when peak-hour requirements exceed 6, or at most 8, gate positions, a shift to the decentralized scheme is indicated.

In the decentralized plan, the passenger and his baggage arrive, via ground transportation, at the apron building and near the departing airplane. This is particularly true if organized ground transportation is used, since it appears that to permit private cars and perhaps even taxicabs on the roadway flanking the apron building would result in traffic confusion. The majority of airline functions will be in the apron building, and ticket-selling, but no check-in, will be conducted in the main building. Mail and express are handled from a central location, usually in the main building.

Under certain circumstances, concentration of the activities of each airline in the apron building will result in a series of centralized areas arranged in the apron building in a decentralized fashion. This scheme is usually advisable when several airlines serve the field and when traffic demands approach the capacity of a dual-runway system. It will be found that many functions not ordinarily performed at the terminal building are included under either phase of a decentralized plan. This plan offers its greatest advantages under conditions of high schedule frequency.

It has been stated that the decentralized plan does not provide the advantages to concessionaires found in the centralized one. This is not necessarily true. If the passenger arrives at the airport but a reasonable time before plane departure, as when organized ground transportation is used, his time for the patronage of concessions is limited. Walking distances usually discourage the through passenger from going to the main building. It is submitted that the usual wants of boarding and through passengers—for cigarettes, newspapers, magazines, soft drinks, etc.—are better met by vending machines conveniently located in the apron building. Thus concession revenue should be increased rather than otherwise.

A very excellent report was prepared by Dr. Joseph McGoldrick, former comptroller of the City of

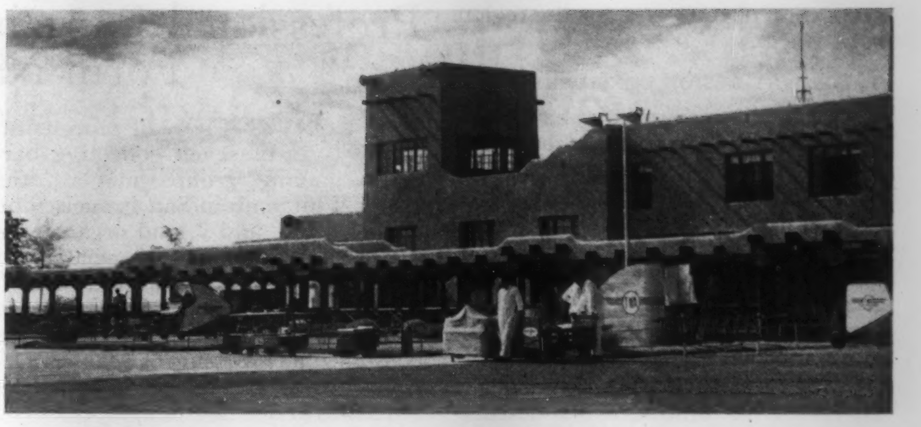
Function of Washington, D.C., Terminal Determined the Design of Its Approaches

New York, urging that the airlines consolidate their various functions. He estimated substantial savings due to better utilization of personnel and reduced building requirements. The airlines have tentatively agreed to try out this scheme at several representative airports, and the results will be watched with great interest. The magnitude of the effect of such consolidation on the planning of terminal facilities is obvious; it is as yet too early to define the details, but the engineer and the architect must keep this in mind.

Generally, either the centralized or the decentralized scheme is at its best when two-level operation is planned. Airline engineers and others who have studied the problem are agreed that there must be a vertical separation of the paths of passengers and cargo traffic. Airline operational offices and cargo movement by tractor trains or such are limited to the first, or ground floor of the building and passenger traffic to the second. This separation should be incorporated in the building design regardless of centralization or decentralization. A plea is hereby made for sound functional design in all buildings, with less emphasis on monumental character. We are dealing with an advanced means of transportation, and everything about it should be clean-cut and modern.

CONCESSION REVENUE SIZABLE

Only recently has sufficient cognizance been given to the possibilities of non-airline and concession revenue. An airport can be made self-supporting without onerous charges to the airlines and other users. The civic contribution to construction and maintenance costs is justified by the convenience and service offered to residents and business houses in the community. Airport employees pay rent and taxes and patronize local businessmen, and all the considerations that make the shoe factory, the bank, and the corner grocer an asset likewise apply to the airport. The airport is, in reality, a small community, and a careful analysis should be made of the types of concessions it can support. Some of the revenue producing activities are: restaurant, coffee shop and snack bar, cocktail lounge, souvenir and jewelry shop, news and tobacco counter, public lockers, florist, bank, barber and beauty shop, laundry and cleaning agency, garage and service station, car parking, department-store representation, vending machines, and others.


"Atmosphere" Was Built Into the Airport Terminal at Albuquerque, N.Mex.

Many of these revenue producers are best located in the main building and throughout the apron building. In many cities, however, the main building will be but one of a number in the terminal area. The complementary buildings will house theaters, hotels, retail stores, automobile and airplane salesrooms, surface transportation terminals, rent-a-car and rent-a-plane agencies, federal buildings, office buildings, etc.

Comprehensive airport planning is not a simple task. It is analogous to planning a specialized community, for that is really what an airport is; and the engineer must have vision and ingenuity to develop a practical, functional, and economical facility. The tremendous investments that will be made in airports in the coming years warn us to plan carefully and thoroughly and with vision—to take full cognizance of the enormous future of this new industry. If we do so, we will not again be faced with so much tangible evidence of poor planning and lack of faith in this form of transportation.

PRELIMINARY SURVEYS NEEDED

First step in the comprehensive planning of a field should be the determination of the need for the field. Studies to be made in such a determination include the following:

1. *The area that will be served.* Since every airport development represents a substantial sum of money, planning should be on a regional, rather than local, basis. By planning regionally, it may be determined that a single airport will adequately serve several communities, with a corresponding reduction in total cost while improving the usefulness of the service.

2. *Income groups included in the area.* This factor will primarily be an important element in the estimation of airline patronage. It will indicate the travel habits of the region and the volume of tourist travel.

3. *The amount, types, and concentration of industry.* A study of this item will indicate the volume of potential business travel as well as mail, express, and freight possibilities.

4. *The type of population.* The geographic distribution of rural, high-density suburban, metropolitan-residential, etc., population should be recorded and careful study made of increasing or decreasing tendencies and of the movement of the centers.

LOCATION AND TRAVEL NEEDS

5. *The geographic location of the community.* Consideration should be given to the community's relation to existing and projected airways and to the proximity of airport sites to such existing or projected airways.

6. *Other airports serving the locality and the type of service being rendered.* This study will indicate interest level in air transportation and will aid in avoiding duplication of activities and indicate the advisability of consolidation.

7. *The overall air-transport needs of the region.* Existing data on the volumes of passengers and cargo are invaluable, since they can be projected to indicate the ultimates. Comparisons should be made with other communities having similar characteristics of population types, industry, etc.

8. *Types and adequacy of other forms of transportation.* Air transportation does not necessarily compete with other forms of transportation; but, where such other forms are inadequate or otherwise unsatisfactory, air transportation can be expected to alienate a proportionate share of the total business.

The results of these surveys will give the engineer the data necessary to determine which type of airport will be required to properly serve each segment of the region and the proportion of each type for the region as a whole.

IMPORTANT DESIGN CONSIDERATIONS

After preliminary studies have been made, the development of any airport, regardless of its size and type, must be predicated upon a number of considerations. Briefly, and in general, they are:

1. *Flexibility.* The development of aircraft, particularly of the transport type, is so rapid that no one can safely forecast their ultimate design.

2. *Accessibility.* The passenger is interested in destination-to-destination time, not merely airport-to-airport. The average airline-trip length is decreasing, so that the provision of adequate access highways, or speedways, is a major consideration. The availability of all forms of surface transportation to the airport should not be overlooked, and particularly the presence or early provision of public transportation systems.

3. *Adequate size.*

4. *Freedom from obstructions.* There is no substitute for an obstruction-free site, and it is mandatory to prepare an obstruction survey of each site under consideration.

5. *Approach zoning (avigation easements).* Unless legal steps are taken to protect approach paths to, and surroundings of, the airport, its utility may be severely restricted in the future. Zoning ordinances are not necessarily detrimental to land values but may conceivably enhance them if intelligently administered.

6. *Meteorological conditions.* Favorable meteorological conditions are an important consideration in site selection.

7. *Balanced capacities.* The capacities of the airways, of the runway system, taxiways, terminal building and loading apron, hangars, access roads, vehicular parking areas—all must be properly coordinated to obtain a smooth and uninterrupted flow of aircraft, vehicles, passengers, and cargo.

8. *Sound economic development.* Land-acquisition costs, costs of site preparation, availability of utilities and of access highways play an important part in site selection, and the engineer may find an otherwise excellent location ruled out on one or more of these counts.

Editor's Note:* *This article has been prepared from a paper presented by the author before the Air Transport Division at Kansas City.

Professional Bargaining Units Form National Organization

A CONVENTION of representatives of seven collective bargaining groups met at the Hotel Whitcomb in San Francisco on October 5, 6, and 7, and organized a National Professional Association of Engineers, Architects, and Scientists. Collective bargaining groups represented at the convention have a combined membership of 3,000 professional engineers, architects, industrial scientists and similar employees.

The convention determined to extend the influence of the groups by utilizing their combined experience, numerical strength, and financial resources to promote by appropriate methods the economic welfare and professional status of members, and to protect their right to bargain collectively through agencies of their own choosing.

The San Francisco convention was called by the organizing committee which met in Spokane at the same time as the ASCE Summer Convention (CIVIL ENGINEERING, September 1946, page 380). It had been scheduled for some satisfactory date before September 30, but to obtain suitable travel and hotel facilities was postponed a week, and San Francisco instead of Sacramento was selected for the location (CIVIL ENGINEERING, October 1946, page 465).

During the three-day San Francisco convention the form of the organization, the objectives, and the framework of a constitution were agreed upon, and provision made for conducting the business of the Association until the constitution can be ratified by the constituent groups of the federation, and the first convention of the Association is called. The tentative name for the federation, National Professional Employees Association, suggested by the Spokane committee, was changed at the San Francisco convention to the National Professional Association of Engineers Architects, and Scientists, more nearly to indicate its nature and scope.

It was proposed that the member groups of the Association retain complete local autonomy to handle local problems through their respective collective bargaining units; and when necessity arises they may combine on a zone basis to handle zone-wide problems. The groups are:

Engineers Guild of Oregon (Portland)
Professional Engineer Employees Association of Eastern Washington (Spokane)
Sacramento Group of Professional Engineering Employees
San Francisco Group of Professional Employees
Seattle Professional Engineering Employees Association
Southern California Professional Engineering Association (Los Angeles)
Southwest Washington Association of Professional Engineering Employees (Olympia)

Other groups with similar objectives, which are named below, indicated unofficial interest in the new Association by the presence at the convention of observers or the submittal of proxies:

Association of Industrial Scientists (Emeryville, Calif.)
Central Ohio Group of Professional Engineering Employees (Columbus)
Engineers and Architects Association of Colorado
Engineers and Architects Association, San Francisco Bay Area Chapter
Tennessee Association of Professional Engineering Employees (Knoxville)

Donald B. Slawson, Portland, secretary of the Engineers Guild of Oregon, was named secretary of the interim executive committee of the Association, which will conduct business until permanent officers and committees are elected at the Association's first convention. Other members of the interim executive committee are Sterling S. Green, chairman of the Southern California Professional Engineering Association, who was retained as chairman, and Trygve W. Hoff, chairman of the Seattle Professional Engineering Employees Association, who was retained as vice-chairman.

Ralph W. Hutchinson, of the Sacramento Group of Professional Engineering Employees, was selected as chairman of the committee to develop a constitution for the Association based on the framework adopted by the San Francisco convention. Howard S. Lane, secretary-treasurer of the San Francisco Area Group of Professional Employees, and Howard A. Stingle, chairman of the Professional Engineer Employees Association of Eastern Washington, were named to assist the committee on constitution and the interim executive committee of the Association to prepare the document for the ratification of the constituent groups.

Local Sections Have Responsibility in Solving Professional Problems

By W. W. Horner, President ASCE
Consulting Engineer, St. Louis, Mo.

President Horner, in an address delivered before the Local Section Conference at the Fall Meeting of the Society in Kansas City, urges Local Sections to supplant social activities with active participation in the solution of the many problems which the civil engineering profession faces.

PROBABLY THE THING that has impressed me most deeply is the apparently endless succession of problems which the engineering profession, and our branch in particular, is having to face, and the appallingly small proportion of our membership that is actively engaged in attempting to solve them. I have also concluded that your Society is reaching the limits of its effective performance for the profession, and for the public, in so far as performance can be achieved through the officers, the staff and the national committees.

Many of our problems are so country wide and so deep seated in their background that effective action can only be achieved by mass action. This means to me that to a great degree our efforts must be spread out and transferred to our Local Sections, where the majority of our membership is now organized and where they are in a position to be effective.

I have visited a number of the Local Sections, and I have discussed Local Section operations with the officers of others. There is tremendous variation across the country and from Section to Section in the character of Local Section activity, and back of that in the minds of our members as to where the Local Section stands in the Society's structure.

TOO MANY SOCIAL CLUBS

Today, in my opinion, too many of the Sections are purely social clubs. Possibly 50 percent are carrying on programs of value in terms of the technical improvement of their members and of informing their members on local affairs. In my opinion, only a small minority of the Sections are aware of, or feel a definite responsibility to attempt to participate in the solution of, professional problems of a national character.

As I recall it, the formation of the Local Sections was the result of a revolution within our organization against an alleged domination by the New York office. The result was that Local Sections were set up as places where groups of the Society's members could discuss Society affairs and put proper pressure on the national organization when and as it seemed to be needed, but other and broader objectives are indicated in the Constitution. These objectives appear to have been retained in the programs of a distinct minority of the Sections.

It is true that many Local Sections are sponsoring members of metropolitan or regional engineering councils and through these agencies may be somewhat more effective in forwarding locally the objectives of the profession as a whole. I have, however, reached the further conclusion that many of these councils have lost their initial enthusiasm and are relatively dormant today.

FEW MEMBERS PARTICIPATE

As I see it, the task of meeting the problems of the profession and of the engineers' service to the public has been rather generally delegated to your Board of Direction and to a relatively few committees set up under it. Probably less than 200 members of the Society are actively engaged in the organized work of advancing and protecting the profession. Possibly another 500 are actively engaged through our Technical Divisions in the technical improvement of our members.

A relatively few, certainly not a large number, are working in these fields in those Local Sections which have adopted broad objectives and programs. This is rather a poor showing for an organization with 22,000 members. Somehow we have failed to give our individual members at large a proper possibility for a specific professional service, and somehow we have failed to inspire in them the urge to demand such a possibility for service.

It seems to me that this situation has reached a point that calls for a rather drastic revision of the relationship between that part of our organization which is national in scope, that is the Board, the staff and the national committees on the one hand, and on the other the members of the Society as now organized into Local Sections.

LIAISON REQUIRED

It seems to me to require a two-way liaison under which current information as to problems and possible services should be furnished in a simple, direct and understandable form from the national to the local level, and on the other side a change in Local Section objectives and programs which would not only provide for the absorption of this information by the members but for its critical analysis, the development of constructive suggestions from within the Local Sections and a plan under which more of our members might participate in the solutions.

During the year one important step in this direction has been taken at the national level. I refer to the re-orientation of the publication policy through Civil Engineering. Before the year is over, I think this magazine will have been changed from one in which the emphasis has been on technical articles of a secondary character (as compared to Proceedings) to one in which the whole emphasis is on information to our members on matters of current interest, both professional and technical.

RECOMMENDATIONS ASKED

I hope that as our members come to understand this change they will have developed the habit of a quick and critical reading of these pages as they are received, and will develop a system under which this material may come to be discussed in Local Section meetings, and that definite recommendations will be developed within the Local Sections and communicated to the Board and the staff.

A second step in the same direction is the policy of your current Board of referring as many matters as may be, directly to the Local Sections for discussion, analysis, and recommendation.

Your Local Section conferences this year have become forums for discuss-

(*Continued on page 509*)

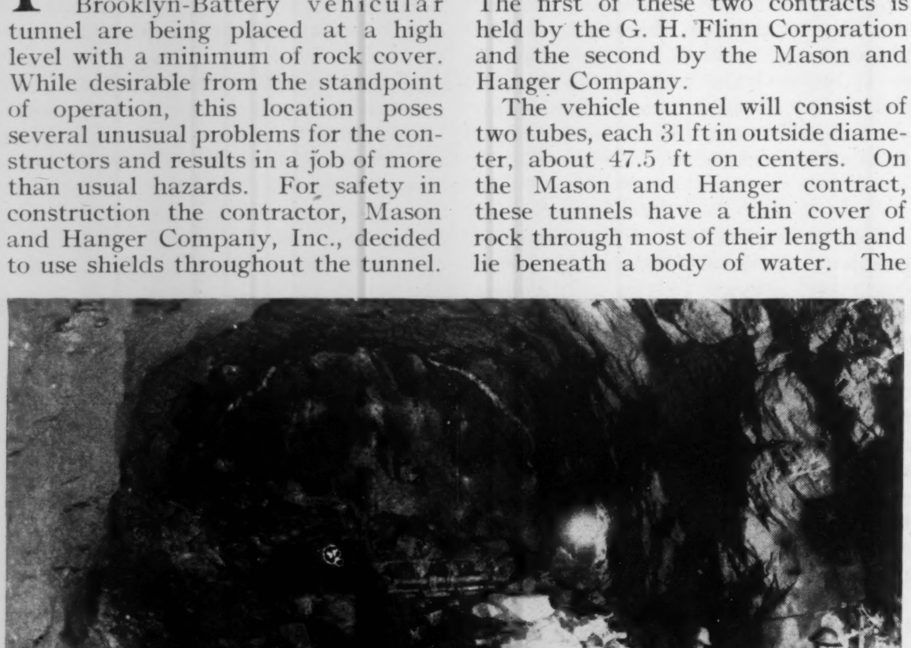
Shield Used in Rock Tunnel Where Hazards Are Unusual

Pilot Tunnel Driven for Brooklyn-Battery Vehicular Tubes

By Howard L. King, M. ASCE
Chief Engineer, Mason and Hanger Company, Inc., New York, N.Y.

INTERRUPTED by World War II, progress on excavation for the Brooklyn-Battery vehicular tunnels has been resumed under unique conditions. Construction methods chosen by the contractor are particularly adapted to the varying soundness of the rock cover. Efficiency of the work, as explained by Mr. King, is largely dependent on the equipment used.

FOR reasons of economy of operation, the tubes of the new Brooklyn-Battery vehicular tunnel are being placed at a high level with a minimum of rock cover. While desirable from the standpoint of operation, this location poses several unusual problems for the constructors and results in a job of more than usual hazards. For safety in construction the contractor, Mason and Hanger Company, Inc., decided to use shields throughout the tunnel.



Mucking Operations with a Conway Loader in the Pilot Tunnel

When completed, the vehicle tunnel will connect the south end of Manhattan Island with the Borough of Brooklyn in the City of New York. Most of the work, under direction of the Triborough Bridge and Tunnel Authority, is now under contract. The two largest contracts are for the under-water sections, one from shafts on Hamilton Avenue, Brooklyn, under Buttermilk Channel, to the ventilation shaft that is to be constructed a short distance off shore from Governor's Island, and the second (Fig. 1) from a shaft in Battery Park under the East River (or the upper bay) to the same shaft. The first of these two contracts is held by the G. H. Flinn Corporation and the second by the Mason and Hanger Company.

The vehicle tunnel will consist of two tubes, each 31 ft in outside diameter, about 47.5 ft on centers. On the Mason and Hanger contract, these tunnels have a thin cover of rock through most of their length and lie beneath a body of water. The weak and irregular character of the rock adds to the risk; it is a micaceous rock known as Manhattan schist.

A limited amount of information about the location of the rock floor is available from borings taken by the Authority but the contractor must depend on test-hole information and on what each drill round reveals to guide him in directing his work from day to day and in determining what steel supports are needed. The bedding of the rock is contorted and its quality can change, in a distance of a few feet, from firm and hard to partly disintegrated and seamy.

The schist is not a "heavily water-bearing formation." At the present time, with two-thirds of the rock excavation completed, the total inflow of water through seams is not over 400 gal per min.

OVERBURDEN VARIES

The borings show that the overburden above the bedrock is very variable in depth and kind, running from thin river mud to a deep glacial deposit of boulder clay or stratified sands and gravels near the Governor's Island shaft. Where this overburden is thick and of compacted materials, it is a real protection against the chance of flooding the tunnels. On the other hand, under the ship channel there is no overburden; in fact the rock floor has been lowered by submarine drilling and blasting to make the required 45-ft depth of channel. At this point the rock cover will be about 27 ft, which is an adequate roof, but careful exploration to guard against the uncovering of unexpected fissures will be necessary.

In the fall of 1941, the New York City Tunnel Authority took bids on this work, which includes excavation, furnishing, and erection of either a structural steel or a light cast-iron tunnel lining, and construction of the concrete lining inside the metal lining. The Mason and Hanger Company, bidding on cast iron, was the low bidder and the contract was awarded to it October 7, 1941. Then came the Pearl Harbor attack. The War Production Board allowed the excavation of the pilot tunnels to be completed to the end of the contract; after that the work was shut down for the duration. All construction equipment was sent up to the surface, where it was stored and maintained. Ties, rails, and pipe lines were left in place. The tunnels and shaft filled by seepage to mean tide level in about three weeks' time.

Drill Jumbo Used in Pilot Heading Straddled the Mucker

SHIELDS USED

When the contractor first undertook the job, he had to decide whether or not he would use tunnel shields. There was a section about 400 ft south of the construction shaft in Battery Park where the rock floor dropped to about the elevation of the invert of the tunnels at that station. This narrow gorge was filled in with glacial deposits. Here was one location where shields would be of distinct value. Furthermore the contractor felt that there would be areas of considerable length where the rock at the crown of the excavation would be unsound, fissured, and blocky. If shields were provided, the contractor could, in these areas, modify his pre-shield excavation as the rock demanded. He could lower the top excavation line, bring in the sides, and install steel or timber supports to hold the restricted arch. These supports could later be removed and the necessary trimming done from the front of the shield and under its protection.

If no shields were to be used, the soft ground at the gorge would have to be carried on poling boards or by liner plates. If any poor roof was encountered at other stations, the excavation would nevertheless have to be made, and steel supports and lagging installed, to clear the 31-ft-diameter circle necessary for the iron lining.

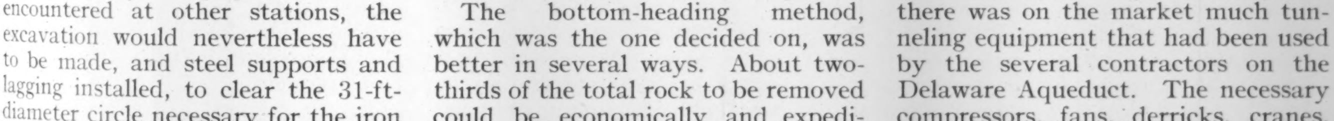


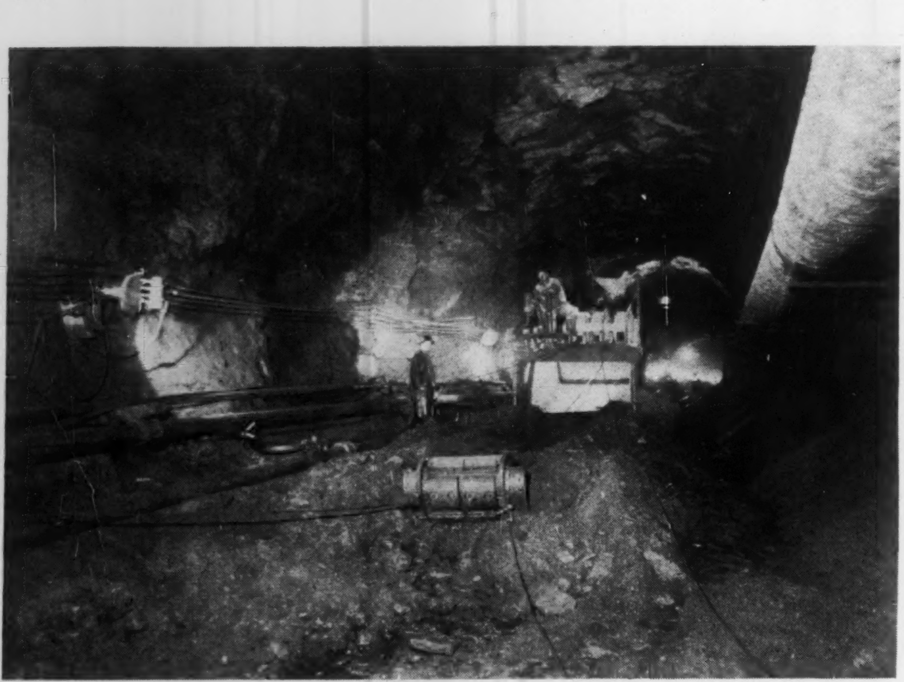
Fig. 1. Profile of West Tube of Brooklyn-Battery Tunnel Section from Manhattan End to Governor's Island Shaft

The contractor decided that the use of shields was the safer and more economical procedure. The structural steel for them could not be obtained while wartime conditions prevailed, but they are now being fabricated by the American Locomotive Works at Dunkirk, N.Y.

The second decision to be made was whether to undertake the pre-shield rock excavation by the top heading and bench method or by bottom heading (pilot tunnel) and enlargement. The top heading and bench method offered some advantages—principally it would make it possible to handle roof supports and lagging expeditiously. Its main drawback was that all operations in the tunnel would have to be conducted under a wide arch; hence, in the interests of safety, steel supports would have to be resorted to for a considerable fraction of the total tunnel length.

The bottom-heading method, which was the one decided on, was better in several ways. About two-thirds of the total rock to be removed could be economically and expeditiously removed in driving a bottom heading 24 ft wide and 24 ft high. The smaller size of this tunnel and its location farther below the top of the rock assured a minimum of roof supports, which were difficult to procure in 1942—and even in 1945. The heavier blasting for the cut was farther removed from the top of the rock than it would have been in the heading and bench method. If the enlargement was subsequently made from the far end back to the shaft, there would be a minimum of occasion for anyone to have to be in the wide tunnel under the 32-ft arch.

In the fall of 1941, war-plant construction was in full swing and priorities were well established. The contract carried an A2 rating that was revoked immediately after Pearl Harbor. In most instances, there was no possibility of securing new construction plant. The contractor had some of the necessary machinery and there was on the market much tunneling equipment that had been used by the several contractors on the Delaware Aqueduct. The necessary compressors, fans, derricks, cranes, cars, muckers, locomotives, and batteries were eventually obtained. It was a major problem in 1942, and it is now again a major problem, to keep some of the older items in commission. It is being done with the help of a large and well-equipped machine shop and a force of mechanics and electricians considerably more numerous than would be necessary if the equipment were newer.



MUCK SCRAPER PREPARING INVERT FOR PLACING OF CONCRETE CRADLE

After the east pilot tunnel had been driven 350 ft from the shaft and the west pilot heading 408 ft, it was necessary to build a concrete bulkhead with locks in each tunnel and make other preparations for putting on air to get through the soft ground at the gorge. The wall of rock between the two pilot tunnels had a minimum thickness of 15 ft. When air was first pumped into the east tunnel, a considerable amount leaked through this wall into the other tunnel. To overcome this loss the west side-wall of the east tunnel was gunited.

After the east tunnel was put under air pressure, two wall-plate drifts were started. These were about 8 ft high and 9 ft wide. Where soft ground was penetrated, it was supported by poling boards that were driven over the caps and outside of the posts of timber bents. These drifts were carried ahead to a station in the rock on the far side of the gorge, where we were certain (from boring data) that the whole drift would be out of the soft ground and under about 10 ft of rock. Concrete wall-plate benches were poured in the drifts (Fig. 2).

CORE BETWEEN DRIFTS EXCAVATED

Excavation of the core between the drifts was then undertaken. The roof was supported on liner plates which rested on semicircular steel arches made of bent I-beams. This roof was carried to the station at which the wall-plate drifts had been stopped. The total length of this type of construction was 73 ft in the east tunnel and the same in the west. The invert between the concrete side-walls was then trimmed and mucked, and a reinforced concrete cradle was poured having a radius and an elevation such that it will serve as a shield cradle when the shield comes through.

The ground that filled in the gorge was hardpan and peat; it held air ideally. The pressure used was 17 lb, about half the theoretical air pressure. The final step was to pour a concrete arch inside the liner plates, embedding the steel arches. Air pressure was then removed. The concrete arch was drilled and grouted to fill any void between the arch and the liner plates. The air gangs were shifted to the west tunnel, where the same type of construction was carried out.

SIZE OF DRIFTER LIMITED

This drift constituted a bottleneck in the pilot tunnel; it was just large enough to permit the passage of tunnel traffic between the ventilation pipe on one side and other pipe lines on the other side. When the pilot tunnels were extended south of the drifts, the drill jumbo, which carried eight drifters, had to be small enough so that it could be hauled back into or through the bottleneck to escape flying rock from the cut. This meant that for about 350 ft south of the concrete-lined drifts, the pilot tunnel was limited to 15 ft in height and 15 ft in width.

As soon as possible a large jumbo, mounting ten drills, was constructed. The heading was painted for a tunnel 24 ft wide and 24 ft high, whose top was a semicircle of 12-ft radius and whose bottom was an arc that coincided with the 31-ft 8-in. circle that would eventually admit passage of the tunnel shield. The drill pattern comprised 84 holes, which were fired in groups by the use of delay exploders. The place measurement of the pilot-tunnel excavation was 18 cu yd per lin ft of drift.

From July to December of 1942, these pilot tunnels forged ahead; work was carried on around the clock, six days a week. The mean progress per working day in each drift was 16.3 ft. Each heading was served by three gangs who remained in that heading during the complete cycle of tunnel operations. The method under which a single gang on each shift drills and shoots in the two headings in rotation, and a single muck gang removes the excavated rock, first in one tunnel and then in the other, was employed for a while but was not successful. The morale of the men seemed to be better when the gang stayed in one tunnel and performed all the operations, from drilling to mucking.

Only 2% of the total length of the pilot tunnel required roof support.

SMALL DRIFTERS ADEQUATE

For rock excavation, the drifters used were of two sizes—4-in. and $3^1/_2$-in. The smaller size was preferred as being easier to handle. The rock is soft and the extra power of the larger drill is not needed. About 4.5 lb of 40% dynamite per cu yd, place measurement, was required. The loose muck bulked 1.7 times the place volume. A No. 75 Conway loaded the broken rock into 4 $^3/_4$-cu yd side-dump cars. At the shaft bottom the muck car was dumped into a battleship bucket, which was raised in a hoistway to the top of the shaft by two derricks, one for each tunnel, and swung out over a muck bin. Disposal trucks operated by a subcontractor, Andrew Gull Corporation, carried the muck to a stockpile nearby. On the day shift, a power shovel loaded disposal trucks from the stockpile.

In the tunnel, 12-ton storage-battery locomotives hauled trains of two cars only. The steepest grade was 3.7%; on this a second locomotive was used. In back of the Conway mucker, there was a cherry-picker that straddled the main-line track.

During the period when the work was shut down by order of the War Production Board, the tunnels were left full of water. It was felt that there would be less corrosion of the pipes left in the tunnels if they were under water than if the headings were kept pumped down and the pipes exposed to drip and damp. The ventilation pipe did rust badly; the other pipes were not much damaged.

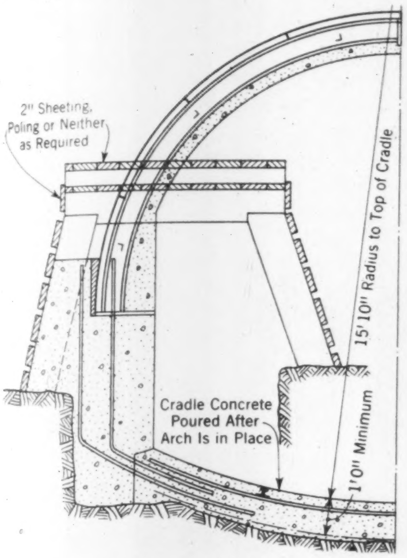

2'' Sheeting, Poling or Neither as Required
15'10'' Radius to Top of Cradle
Cradle Concrete Poured After Arch Is in Place
1'0'' Minimum

Fig. 2. Half Section Through Tunnel Excavated in Soft Ground

Another advantage of leaving the tunnels full of water was that there was no seepage of water through rock seams, and probably less weathering. The storage batteries were kept in condition by recharging every three months.

TUNNEL WORK RESUMED

The contractor was ordered to resume work on September 18, 1945. The reconditioning of equipment and the pumping of water from the tunnels was started at once. The roof of the tunnel was scaled as it was exposed. Only in one spot, just south of the gorge in the west tunnel, was there serious deterioration of the schist. At this point, disintegrated rock had dropped from a seam until there was an open fissure extending about 7 ft above the roof of the tunnel, almost up to the hardpan. Here roof supports were erected, a concrete arch was poured, and the seam grouted. By the end of October unwatering was complete.

The method used in mucking the invert and pouring the concrete shield cradle permitted a mean progress of 75 ft per working day in each tunnel. The 3-ft-gage, center-line track was taken up for mucking and later restored to correct line and grade by supporting the steel mine ties on pins doweled into the rock. The rails, so secured, were used as a track for the side-dump concrete cars; they also guided and supported a heavy steel screed that shaped the concrete to the required width and arc. The concrete between the rails was depressed so as to clear the flanged wheels of cars and motors, which now use this track for all tunnel traffic. The two rails and the concrete in which they are embedded will form the cradle on which the shield will be advanced. On each side of the 15-ft-wide cradle is a flat bench where the concrete extends horizontally to the rock. This bench now carries timber sills on which are spiked the rails that carry the heavy drill carriage for the enlargement.

For the enlargement operation, there is in each tunnel a large drill carriage, equipped with ten drifters, which faces north and is progressing from the far end back toward the construction shaft. The excavation is above and at the sides of the pilot tunnel. About 70 horizontal holes are drilled for each 10-ft advance. The mean place measurement of the rock in the enlargement is 12 cu yd per lin ft. About 2.4 lb of 40% powder is required per yard. The rock is dropped onto the invert and does not fly. It is necessary to pull the jumbo back only 30 ft to clear the blast.

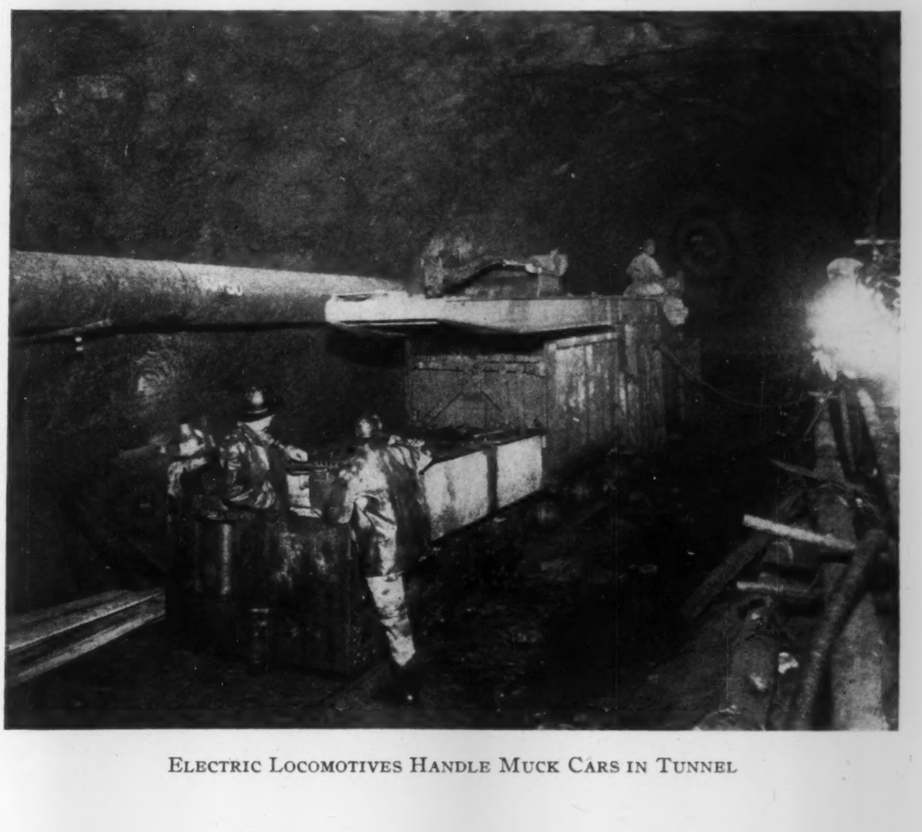
BUFFER PLATE ON JUMBO

After the smoke has cleared, the returning miners first scale the roof of the pilot tunnel for a distance of 50 ft from the point where the blast was fired, working from the cherry-picker as a scaling platform. They then climb over the muck pile, restore lights and high-pressure air on the drill carriage, and extend a cantilever scaling platform out from the top level of the jumbo under the newly blasted roof. From this high level they are able to inspect and scale the new roof and the face. The Conway mucker then attacks the muck pile from the north side, working toward the jumbo. To prevent the mucker from pushing the last of the rock pile out of reach, a steel-plate buffer is carried on the front of the jumbo. When mucking is finished, this buffer is raised up out of the way. When the drill carriage is pulled ahead for the next round, the roof is again carefully scaled.

When the rock is seamy and blocky, steel supports are erected. They consist of channels back to back, or H-beams; they are usually spaced 6 ft on centers and are lagged with timber. They are carried on timber wall-plates at the springing line.

Driving of shields and erection of cast-iron tunnel lining will begin about February 1947. Construction of the interior concrete lining will begin about a year later. The contract is scheduled to be completed in September 1948.

J. J. Nanry, M. ASCE, is resident engineer for the Triborough Bridge and Tunnel Authority. Allan B. Lincoln, M. ASCE, is job manager, and John Ury is general superintendent for the Mason and Hanger Company, Inc.

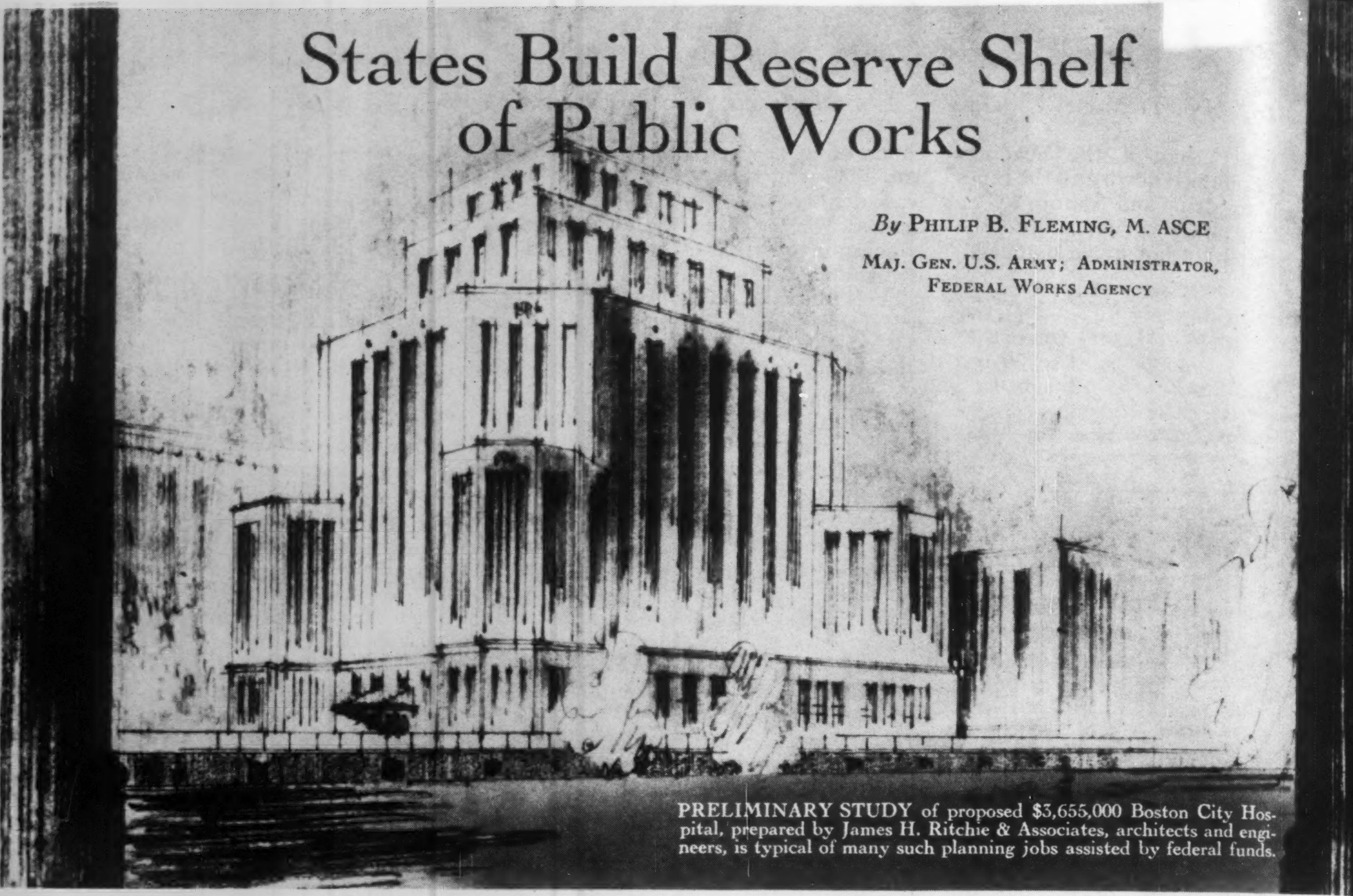


Electric Locomotives Handle Muck Cars in Tunnel

States Build Reserve Shelf of Public Works

By **Philip B. Fleming, M. ASCE**

Maj. Gen. U.S. Army; Administrator, Federal Works Agency



PRELIMINARY STUDY of proposed $3,655,000 Boston City Hospital, prepared by James H. Ritchie & Associates, architects and engineers, is typical of many such planning jobs assisted by federal funds.

ALTHOUGH HOUSING is the number one construction problem in the country today, states and their political subdivisions are building up a reserve shelf of public works plans that can be used to help stabilize the construction industry and provide useful employment in the event of another depression. Public works projects are not built, and should not be built, merely to provide jobs, but the fact that most states and thousands of local communities, in a time of relative prosperity, are planning good jobs against a time of adversity is in itself revolutionary. If such projects are soundly conceived and executed and are designed to meet a genuine need, they carry their own justification. At the same time it is now generally recognized that their timely construction can have far-reaching effects upon our entire economy.

PLANNING NOW UNDER WAY is being assisted with federal funds by the Federal Works Agency under the authority of Title V of the War Mobilization and Reconversion Act of 1944. In addition, without federal assistance, some states, counties, cities, school boards and other governmental units have been able to complete plans in considerable volume.

Congressional legislation under which state and local planning is being stimulated authorizes the federal works administrator to make advances, from such funds as may be appropriated for the purpose, to the states and local communities for public-works planning (housing excluded), to be repaid without interest when the construction of projects so planned is begun. It requires that 90 per cent of the available funds be allocated among the states in proportion to population, while 10 per cent may be allocated at the discretion of the administrator. Any intention on the part of Congress to participate in the financing of actual construction is specifically disclaimed.

To date $65,000,000 has been appropriated to carry out the program, a sum which, it is estimated, will suffice to plan public works improvements to cost $2,100,000,000. As of September 1, 4,630 applications for $32,258,354 in planning funds had been approved, and this sum was being used to plan projects with an estimated construction cost of $1,089,055,489. Approximately 3,000 applications for an additional $39,067,744 were under review in the nine division offices of the agency's bureau of community facilities. Plans for state and federal-aid highway construction to cost about $650,000,000 were completed July 1.

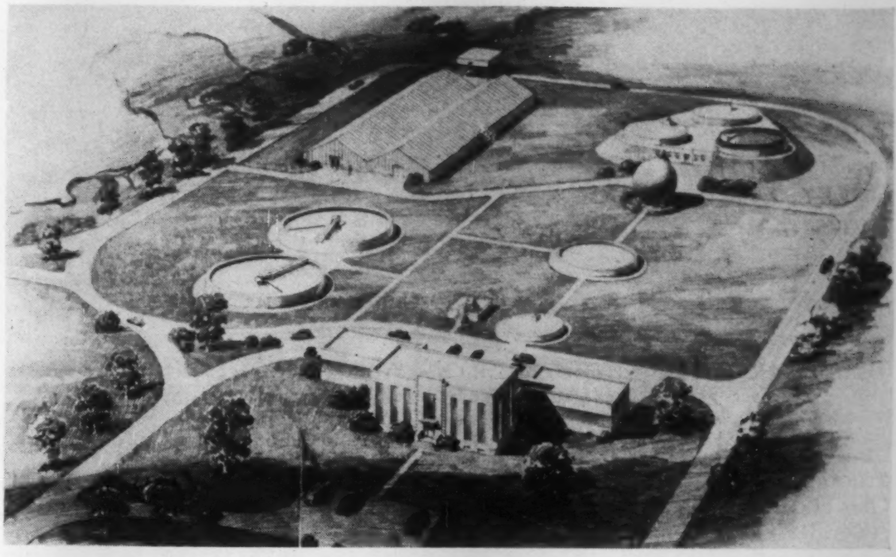
Eight states have established funds of their own which are being used to assist their political subdivisions in plan preparation. These states, and the sums appropriated by each for this purpose, are New York, $5,080,000; California, $8,500,000; Michigan $5,000,000; Illinois, $4,850,000; Pennsylvania, $1,000,000; New Jersey, $500,000; Maryland, $500,000; and Indiana, $500,000. Indiana makes loans from its planning funds to local communities. The other seven states pay half the cost of local plan preparation. Some local communities in these states have been granted federal advances to meet the remaining 50 per cent of the cost.

For some months the Federal Works Agency has been conducting a continuous nation-wide survey in an effort to ascertain the volume, status, and character of the public works planning being done by states and local communities without federal assistance. As of June 30, this unassisted work had resulted in the completion of plans for construction estimated to cost $1,125,789,000. A somewhat larger volume of plans was reported in the design stage, but it seemed doubtful if many of such plans could be brought to completion without federal assistance. Moreover, the bulk of this independent planning was concentrated in a few states—notably New York, Pennsylvania, Michigan, Ohio, Illinois, and California—with New York alone accounting for completed plans for a greater dollar volume of construction than the other five combined.

The potential state and local reserve shelf, therefore, apparently stands at a little less than $4,000,000,-

000 worth of construction, including plans completed without federal assistance, as well as those being assisted by the Federal Works Agency.

To what extent would a reserve shelf of this magnitude meet the need in the event of a general business recession? Past experience throws some light on this matter of adequacy. In normal times new construction accounts for about 10 per cent of the national income, and of all construction about a third is in the form of public works. Assuming a national annual income of 150 billion dollars, in terms of 1940 prices, as necessary to sustain something like full employment, the construction industry should be able to supply 15 billion, and a third of that, or five billion a year, would be in the form of public works.



FEDERAL WORKS AGENCY finances planning of projects such as $1,319,000 sewage treatment plant and pumping stations for East Shore Sewer District, New Haven, Conn., shown here. Westcott & Mapes, Inc., are architects and engineers on this project.

$5,000,000,000 PER YEAR RESERVE NEEDED

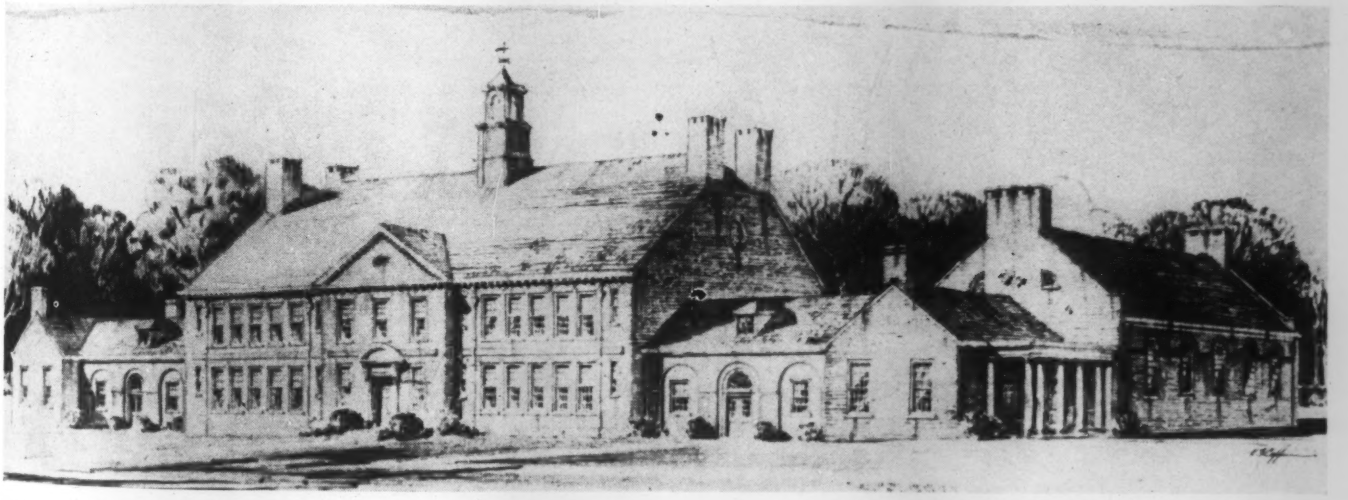
On the basis of experience, again, a total annual expenditure of 3.5 billion dollars would be a reasonable contribution from state and local governments. It is obvious, however, that the state and local planned reserve should be considerably larger than 3.5 billion for the reason that not all planned work can be started at the precise time it will contribute most to economic stability. Some delays, due to weather conditions, legal obstacles, delivery of materials, or the completion of financial arrangements, are unavoidable. A reserve of at least five billion a year probably would be necessary to sustain an actual state and local construction volume of 3.5 billions.

It is apparent, therefore, that the state and local reserve now in sight falls far short of the goal. Not only is it inadequate, but it is subject to attrition. Not all of the work planned can be postponed until the most propitious time for construction. This is especially true of water and sewer works and street construction, which must go along with the veterans' housing program, and probably true also of some vitally needed school and hospital construction. Even though every effort is made to hold down public works construction as much as possible at the present time, the size of the present reserve will inevitably dwindle day by day.

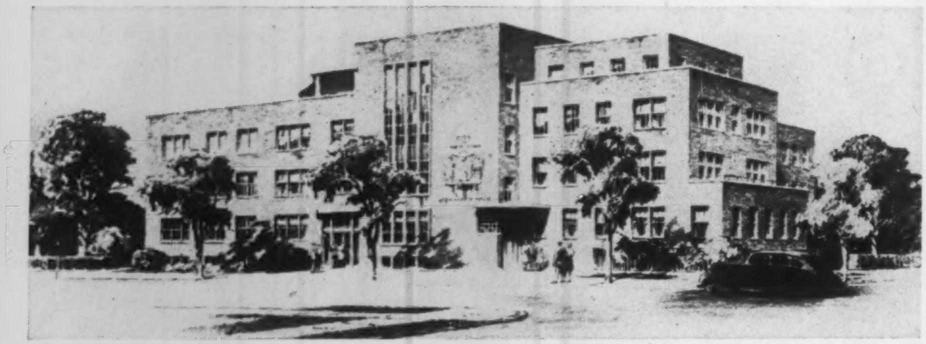
Also, it needs to be emphasized that the state and local reserve must total 5 billion dollars not for just *one* year, but *every* year, while the reserve shelf now accumulating is less than adequate to meet one possible postwar emergency. No provision has been made for its replenishment as projects are completed. It is a one-shot program.

NO CONTROL ON TIMING

Moreover, no provision has been made for "timing" state and local construction to coincide with other efforts to maintain a high level of employment and production. Governmental units that have received planning advances from the Federal Works Agency are at liberty to put their plans into effect at any time they please. Although it is to be hoped that they will prudently husband their plans until their execution will make a maximum contribution to general economic well-being, they can, if they wish, build in a period of high prices and peak employment when such work will come into rigorous competition with private con-



VITALLY NEEDED SCHOOL and hospital construction cannot be postponed indefinitely though effort is made to hold down public works at this time. Shown here is proposed $400,000 grade school, Manasguan, N.J. Coffin & Coffin, New York, is architect.



EAST HARLEM HEALTH CENTER, New York City, is typical of many similar projects assisted in planning stage by federal funds. Preliminary design of $500,000 project shown here is by City of New York.

struction for men and materials. The choice is theirs. Neither the Federal Works Agency nor any other central agency has any authority to dictate as to timing.

If state and local construction had been allowed to proceed all during the war at the rate reached in 1939, the country today would be about 14 billion dollars richer in terms of new or improved highways, hospitals, schools, sewer and water systems, and other useful and needed facilities. The necessities of war brought drastic curtailment to all projects not vitally necessary to the war effort. Total expenditures under Title II of the Lanham Act for the whole war period did not exceed $500,000,000 in federal and state funds, yet this undoubtedly accounted for the greater part of all state and local wartime construction.

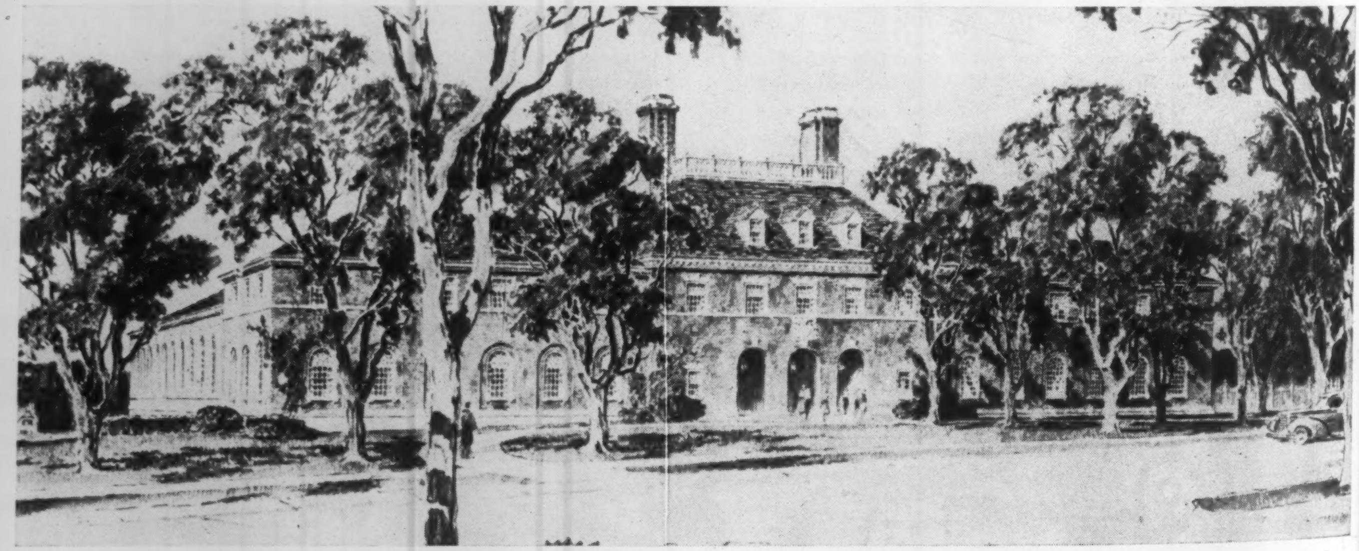
Here we have one measure of the huge backlog of work remaining to be done merely to provide the facilities that would have been provided normally if there had been no war, without allowing anything for future growth and the replacement of the obsolete. A third of all the counties in the United States, with a combined population of 15,000,000, lack a single hospital worthy of the name, and millions of America's children are still going to school in unsanitary and dilapidated one-room shacks. Surgeon General Parran has pointed out that thousands of communities stand in urgent need of new sewer or water systems, or both, and extensions and improvements of existing systems. Our streams are still being dangerously, and unnecessarily, polluted with raw sewage. There is no lack of things urgently needed to be done.

CONTROL NEEDED

The history of the construction industry is one of violent fluctuations. Life to its employers and employees has been an alternating succession of feasts and famines. Building booms have invariably been followed by depressions. One reason for this situation is the fact that private business and public bodies have all entered and left the construction market at about the same time.

Private building cannot be controlled except in periods of dire emergency. It should not be controlled in a free economy. Only the construction expenditures of the various units of government are subject to control. And if that control can be achieved, much can be done to straighten out the kinks in the construction graph. As already noted, not all public works construction can be postponed to coincide with theoretical concepts of ideal timing. New housing developments must be equipped with utilities and access streets and sidewalks before they are usable. Construction in these categories must also coincide with the expansion plans of private business. But, that much public construction can be deferred is certainly suggested by the fact that it always has been deferred year after year; many an ambitious and needed municipal undertaking has been agitated and discussed from 5 to 10 years in advance of its execution. In such matters procrastination is more to be feared than precipitation.

Although the state and local public works reserve shelf has yet to achieve the desired dimensions for even one year's work, and although no provision has been made for the timing of construction or for replenishing the reserve as a continuing function of government, much good already has been accomplished. A new and mutually advantageous form of federal-state-local cooperation for the general welfare is being worked out, and because of the work already done we shall have better planned communities in the future.



PROPOSED LIBRARY BUILDING at New Jersey College for Women, Rutgers University, is $922,850 project resulting from federal-state cooperation in planning stage.

River Navigation Extended by Open-Channel Expedients

Symposium at Kansas City Fall Meeting Presents Extensive Information to Waterways Division

REGULATION and stabilization of the navigable rivers of the world have long depended upon an intuitive process which developed through long association with the eccentricities of particular streams. It is only in recent years that extensive studies, both in the field and in the laboratory, have permitted a more scientific approach to the phenomena of river behavior. Equipped with the results of the latest studies, the Waterways Division of ASCE, through the efforts of its chairman, Col. C. L. Hall, prepared a symposium analyzing the maintenance of a navigable channel in sediment-laden rivers by open-channel methods. Particular attention was given to the Missouri and Mississippi rivers. The papers, here abstracted, were presented at the Society's Fall Meeting last month.

Part I. Characteristics of Rivers Permitting Open-Channel Methods

By MALCOLM ELLIOTT, M. ASCE

COLONEL, CORPS OF ENGINEERS; DIVISION ENGINEER, UPPER MISSISSIPPI RIVER VALLEY DIVISION, ST. LOUIS, MO.

SELECTION of the basic method for improving a river for navigation depends entirely on the character of the stream—its flow characteristics, channel cross section, alinement and slope, amount of suspended matter, and nature of the bed and banks. The most essential flow characteristic justifying the open-channel method of treatment is a sufficient volume of water to keep the navigable channels filled to the required depth notwithstanding the unimpeded flow of water down the river. The amount of flowing water required for navigation for a given channel cross section is of course dependent on the slope.

Where the natural low-water flow is considered insufficient to maintain adequate channel dimensions, the possibility of augmenting this flow by releases from upstream reservoirs may be considered. This has been resorted to in the planning of the Missouri River navigation project. Where the discharge is insufficient to provide a stream of adequate depth and width, recourse must be had to locks and dams which, by backing up the water, can provide any desired depth without using an excessive amount of water.

To be susceptible to treatment by open-channel methods, a river must have a cross section of sufficient area and dimensions to accommodate modern barge fleets. Boats will not move—except at a prohibitive expenditure of power—in streams whose cross-sectional areas do not exceed the cross-sectional area of the boat or fleet by a large margin. Where these dimensions cannot be obtained over the greater part of the length of the waterway, the open-channel method of treatment should not be accepted. Such criteria will not be found in many potentially navigable rivers as nature has built them, but the conditions can be met in some, and probably in many, cases by suitable works such as a bank revetment, contraction works (such as dikes) for increasing depths, and by dredging.

WHY USE OPEN-CHANNEL METHOD

Nature never builds rivers in a straight line. In general the smaller the river the smaller will be the bends and the greater will be the rate of curvature. Barge fleets powered by modern towboats have a high degree of maneuverability but cannot operate on rivers where the bends are too sharp. Reduction of curvature in open channels by creating cutoffs can be resorted to only to a limited degree since the effect is to shorten the length of the stream, and this, if done indefinitely, might eventually increase the slope to the point where velocities would be prohibitive. In the case of small rivers whose curvatures preclude convenient operation of barge fleets, the slack-water or lock-and-dam method of improvement should be selected. Slack-watering automatically submerges some of the bends and also permits digging of cutoffs and easement of curvatures without detrimental increases in slope and velocity.

A large amount of suspended matter in the water (hereafter referred to as "suspended load") is in general unfavorable to the improvement of a river for navigation by locks and dams—this because impoundment of water induces deposition of its silt content and therefore deterioration of the channel. It is generally recognized that streams which are heavily silt-laden should not be obstructed by dams. Excessive suspended loads, therefore, should be accepted as an indication pointing to the adoption of open-channel methods.

Fundamentally, the improvement of silt-bearing rivers by open-channel methods rests on the theory that the river itself must be trained to perform as much of the channel maintenance as possible. In rivers such as the Mississippi and Missouri, the quantities of sediment moved are so vast that reliance on dredging alone to maintain navigable depths would be wholly unreasonable—too costly to contemplate. Accordingly improvement should be so designed that the channel will be self-sustaining, as far as practicable. This necessity therefore points to the employment of open-channel methods on those streams where the bed is of a character that can be eroded to useful dimensions by correctly applied stabilization and contraction works.

Stabilized banks are a necessary feature of open-channel navigation, because if the banks are readily destroyed the river, instead of exercising its erosive power in the adopted channel location, will expend it erratically on scour that not only is not useful but may be very detrimental. An easily eroded bank may be an advantage in the initial training of the river, but after the desired alinement is established, the river should be held there. Banks should be sufficiently stabilized so that after being overflowed in big floods they will remain in place and contain the river after the flood has receded.

Particular attention is given to each of these characteristics of rivers in the following papers.

Part II. Discharge and Sediment Relationships in an Open Channel

By LORENZ G. STRAUB, M. ASCE

DIRECTOR, ST. ANTHONY FALLS HYDRAULIC LABORATORY, HENNEPIN ISLAND, MINNEAPOLIS, MINN.

MOVEMENT of sediments by traction along the stream bed and movement by suspension in the turbulent stream itself are not independent of each other. However, in the present state of the science, it is not practicable to generalize analytically regarding their interrelationship as applied to river control measures. For practical purposes in the analysis of river regulation problems, it is necessary to treat the two modes of sediment transportation independently.

AMOUNT OF SEDIMENT TRANSPORTED

The amount of sediment transported in suspension in a river is dependent primarily upon the availability of the finer-grained material. A purely theoretical analysis to determine the size and quantity of various grades of sediment transported in suspension is virtually impossible, although direct measurement of the quantity and determination of its mechanical composition are relatively simple procedures. However, by applying a theory of turbulence, it is possible to establish the concentration distribution in the vertical of various sizes of sediment particles.

While a wide variety of circumstances influences the amount of suspended material carried by a stream, apparently over a long period of time, at least for a great many rivers, there is a reasonably well-defined relationship between water discharge and sediment transported in suspension. An equation of the form

$$S = KQ^n \quad . \; . \; . \; . \; . \; . \; . \; . \; (1)$$

is found to apply, when S is the silt transported, K and n parameters, and Q the water discharge. Thus, for the suspended sediment discharge of the Missouri River past Kansas City, a theoretical curve represented by the power equation,

$$S = 30.4 \times 10^{-11}\, Q^{2.16} \quad . \; . \; . \; (2)$$

was found to apply quite well for time periods of considerable length. See Fig. 1. Such a relation has also been found to be true for a number of other rivers, the parameters in the equation being very different for each river.

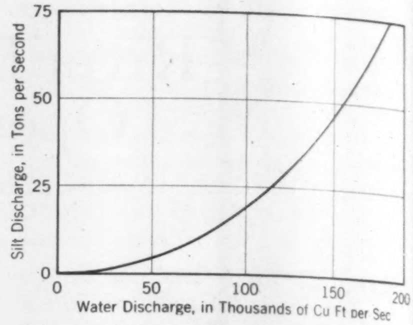


FIG. 1. DISCHARGE AND SEDIMENT RELATIONSHIP in curve for Missouri River at Kansas City applies for time periods of considerable length.

The concentration of suspended load in a river will have considerable influence upon the type of structures used for contraction works and similar regulating measures. Permeable dikes and retards are best adapted to rivers carrying large quantities of material in suspension, while impermeable groins of wing dams are usually better for relatively clear-flowing streams.

MODEL STUDY SHOWS configuration of stream bottom at confluence of streams at equilibrium following particular flow condition. White strings indicate contours.

MOVEMENT OF RIVER-BED SEDIMENT

The bed load of a river is bound to follow more definite laws than the suspended load. Its movement is greatly influenced by the direction as well as the velocity of flow near the stream bed. Nevertheless, over a long time period, approximately the same total amount of material must be transported along successive sections regardless of whether these are bends, crossings, or reaches. Consequently, a determination of the quantity of material moved along a reach suffices for determining the sedimentary load of the river. As a means of determining the amount of material transported along the stream bed and establishing the effect of channel contractions upon the behavior of a river, a theoretical relationship has been developed. This is based upon the hypothesis that the amount of material moved is a function of the traction or shear force along the stream bed, and that the latter is definable by the hydraulic characteristics of the stream, therefore, by a suitable formula for open-channel flow.

One form of equation obtained by the derivation is as follows:

$$G = \Psi[i^{1.4}/C^{1.2}]Q^{3/5}[Q^{3/5} - Q_0{}^{3/5}] \; (3)$$

where G is the quantity of sediment transported along the stream bed in pounds per unit width of channel; Q, the discharge per unit width of channel; Q_0 the discharge per unit width of channel (for a slope i) at which sediment transportation begins; C, the roughness coefficient in an open-channel-flow formula of the form,

$$v = CR^{2/3} i^{1/2} \qquad (4)$$

and Ψ, the "sediment characteristic," an experimental coefficient depending upon the size, specific gravity, and mechanical composition of the sediment.

The foregoing equation may be written in a number of forms for use in the solution of practical problems. The equation is of general applicability but requires experimental determination of the parameters Ψ, *C*, and Q_0. The values of Ψ and Q_0 depend upon the mechanical composition (variation in size of grains as determined by sieve analysis or elutriation), specific gravity, and form of the sediment particles; while *C* depends upon the character of the sediment and also on the rugosities of the channel—independent of the roughness that is due solely to the mechanical composition of the sediment. A formula of this type can be applied to the entire stream by being integrated over the stream section to take into account variations in depth and discharge transverse to the direction of flow.

It is important to recognize that the nature of the sediment normally transported along the stream bed is the principal influence on the development of the stream channel—although the suspended load is quite important as regards construction measures. The latter has great influence on the optimum type of structures (for example, whether permeable or impermeable), but the equilibrium condition of the stream channel is controlled by the nature of the sediment forming the stream bed.

Part III. Alinement Affects Length, Depth, and Stability of Channel

By J. F. Friedkin, Assoc. M. ASCE

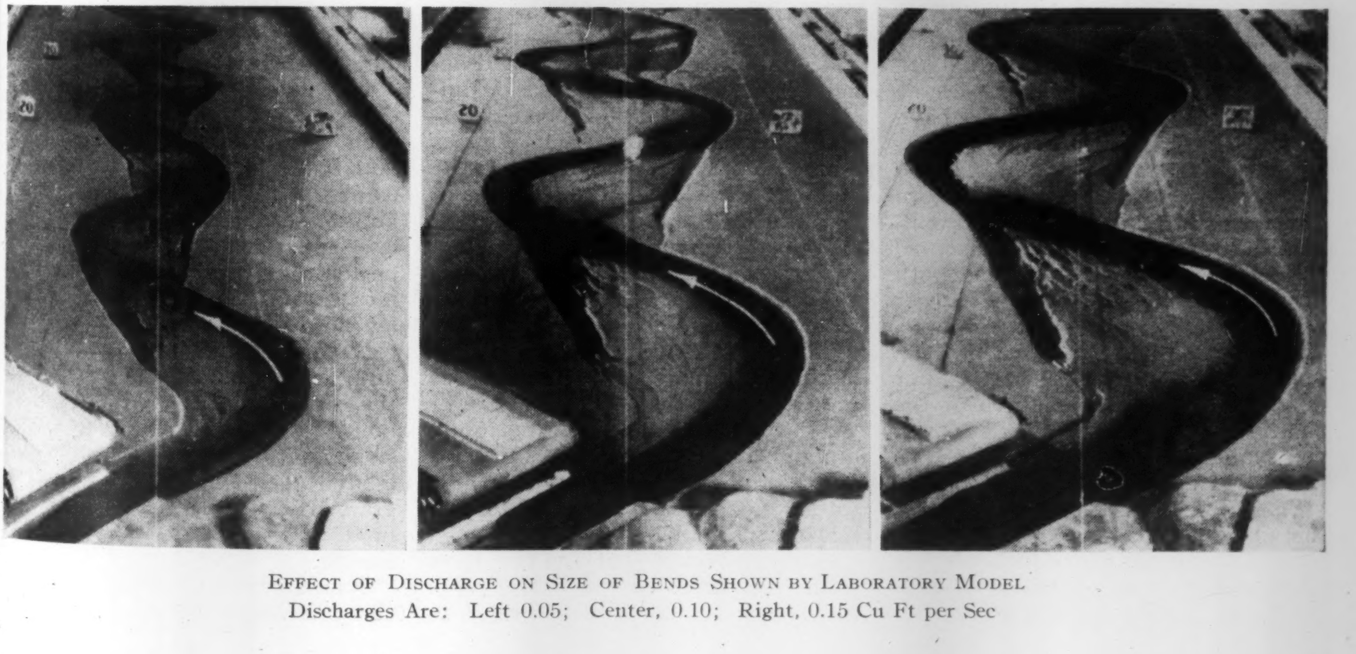
Hydraulic Engineer, International Boundary and Water Commission,
United States Section, San Diego, Calif.

As a result of bank erosion and their heavy sand burden, alluvial streams ranging in size from rivulets to the Lower Mississippi naturally, and in a similar manner, develop a meandering alinement. This alinement is divided into three types: bends, which comprise most of the length of such rivers; crossings, which are the points of inflection between adjoining reverse bends; and reaches, which are the comparatively straight stretches. Each type has certain characteristic cross sections and a varying degree of instability.

In the bends, triangular-shaped cross sections develop, with the point of greatest depth along the concave banks. Such cross sections occur here because the alinement tends to direct and concentrate the flow against the concave banks, along which the scouring forces develop a relatively deep channel, and because there is a concomitant tendency for the sand entering a bend to deposit on the convex shore, shoaling that part of the cross sections. With a well-defined deep channel along the concave banks of bends during low as well as high water, these sections of river present few difficulties for navigation. On the Lower Mississippi the depths in bends range from 30 to 80 ft at low-water stages.

Crossing over from one bend to the next, usually through a short tangent, the flow spreads, and as a consequence the sand-carrying capacity in a crossing is considerably less than that in a bend. During high flows, when scour occurs in the bends, heavy deposition occurs in the crossings. Here, the cross sections are more nearly trapezoidal in shape and shallow as compared to the bends. It is the shallow low-water depths in the crossings that are controlling for navigation. On the Lower Mississippi these depths limit the project depth to 9 ft above Baton Rouge. Even to obtain that depth, some crossings have to be dredged during low-water seasons, notwithstanding the fact that the low flows on this river are usually in excess of 100,000 cu ft per sec. Moreover, low-water channels through crossings are generally somewhat unstable since following each high flow the low flows tend to scour out new channels through the crossings, and often these channels are in locations different from those of the previous low-water season.

Though meandering rivers are generally thought of as being a continuous series of reverse bends, many comparatively straight stretches occur. Nearly 20% of the length of the



Effect of Discharge on Size of Bends Shown by Laboratory Model
Discharges Are: Left 0.05; Center, 0.10; Right, 0.15 Cu Ft per Sec

Lower Mississippi River is made up of such reaches; one just above Memphis is nearly 20 miles long. These reaches are usually the most troublesome for navigation, the cross sections are generally wider than in other sections of the river, the low flow is often divided by middle bars, and as a consequence the low-water channel may be particularly unstable, with numerous shallow crossings through the bars.

It is observed in nature that the magnitude of bends of alluvial rivers varies generally with the magnitude of the flows, the bigger the river the bigger the bends. In the laboratory, where parallel conditions with respect to the other variables may be obtained, this relationship between the flows and size of bends was further proved, as shown by the accompanying photographs. Whereas on each river the minimum radius of curvature depends generally upon the discharges of the river, above that minimum there is little uniformity in the size and shape of bends. On the Lower Mississippi River, bends vary from those having a radius of a few thousand feet to those having a radius of several miles. This is due to the difference in the approach alinements into the bends, the effect of which was well illustrated in the laboratory, and is due also to the differences in the erodibility of the bank materials.

The natural meandering alinements of alluvial rivers having shallow straight reaches and highly sinuous bends, and being generally unstable, leave much to be desired for navigation and for flood control.

THE IDEAL ALINEMENT

The ideal alinement for an alluvial river appears to be one having bends of approximately the mean size found on that river. On the Lower Mississippi the bends of this size have a radius of curvature of about 3 miles, and bends of a radius up to 5 miles do not appear objectionable. Such an alinement would provide a well-defined low-water navigation channel throughout, and the sinuous length of that channel, taking the Lower Mississippi River as an example, would not be more than about 40% longer than the air-line length. For flood control, the elimination of the sharp and elongated bends is, of course, desirable.

With the increasing need for the stabilization of the caving banks of alluvial rivers, so as to secure the levee systems and riparian lands, the requirement of an alinement of easy bends is further emphasized. Recent laboratory studies at the U.S. Experiment Station indicate qualitatively that if a channel is stabilized in good alinement, the stages for peak flows will be lowered. On the other hand, it has been indicated on the Lower Mississippi River, as well as in the laboratory, that stabilization of sharp bends tends to increase their effects as obstructions to flood flows.

The next question is how to approach the desired alinement. The answer appears to depend first on the feasibility of improving the alinement, which in turn depends generally on the size of the river. Small rivers, such as many of those in Europe which have maximum discharges of less than about 200,000 cu ft per sec, have been completely realined and stabilized.

On the Missouri River, which has discharges as high as 600,000 cu ft per sec, considerable success has been experienced in river training by means of permeable dikes along an alinement not at too great variance with the river's natural tendencies. On the Lower Mississippi River, where maximum discharges are about 2,000,000 cu ft per sec, the magnitude of the natural forces is so great that the use of dikes to direct the current and improve the alinement has not proved altogether successful.

The most significant major modification of channel alinement found practical on the Lower Mississippi River is the use of artificial cutoffs by which objectionable over-developed bends up to 20 miles in length have been eliminated. Sixteen such cutoffs during the period 1929–1942 have resulted in lowering flood stages 718 ft at Vicksburg and 12 to 14 ft at Arkansas City. The river, shortened by about 150 miles, has been improved for navigation.

The surface scars of old meanders of the Lower Mississippi River provide a record of thousands of years to show that there is no naturally stable alinement for such meandering rivers—that a desirable alinement can be retained only by stabilization of the caving banks. Such stabilization is especially needed on the Lower Mississippi to retain the shorter and improved alinement resulting from the cutoff program and to secure the levee system against the river's meandering, which may be accelerated to some extent by the increased slopes and higher velocities also resulting from this program. And studies of the stable sections of this river, supplemented by laboratory studies, indicate that if the channel is stabilized on a good alinement, the river will be further improved for navigation and for flood control.

Part IV. Soil Characteristics of Bed and Banks Determine Improvements

By CHARLES SENOUR, M. ASCE

CHIEF ENGINEER, MISSISSIPPI RIVER COMMISSION, VICKSBURG, MISS.

THE soil characteristics of a river's bed and banks not only influence the selection and design of open-channel methods of improvement, but in large degree determine whether improvement is or is not required. It is quite true that differences in slope and differences in depth of flow of a river for equal discharge are inseparably interrelated. With the close interdependence of the several factors that determine the characteristics of a river, it is difficult to distinguish and isolate any one factor that may be pointed to as primal, but in the case of the Lower Mississippi at least, it seems quite probable that differences in both slope and depth hark back in large measure to differences in the soil characteristics of bed and banks.

A great trough cut by the river from the head of the Mississippi embayment to the sea was filled in late Quaternary time by the streams that issued from the melting ice cap. These streams encountered at first a very much lower level of the sea than now obtains, and by virtue of their resulting steep gradients were able to carry even the coarsest sediments far to the south of the present limits of such transport. Nevertheless, the coarsest sediments were deposited first and the finer carried farther on. As sea level rose, the valley floor continued to build up, the coarser sediments stopping farther and farther north (upstream) and those that had been deposited to the Southward during the eras of steeper slope and lower sea level, being covered deeper and deeper with finer-grained deposits, which in turn graded finer and finer toward the river's mouth.

Fundamentally, then, the deposits through which the Mississippi flows are composed of late Quaternary sediments grading coarser with increases in depth and in latitude. The fine-grained deposits, depending on their depth and degree of consolidation (to a large extent their antiquity), resist erosion by the river currents far better than do the surrounding sands, and so interrupt the symmetry of the river's course, deflecting its currents sometimes to form bends of most unusual shape and sometimes to form "hard points," to which bank revetments or dikes may be tied in to avoid flanking by the current.

So numerous and so important in the planning of regulatory works are these fine-grained deposits that the Mississippi River Commission has had them charted by a geologist throughout the sandy parts of the valley. Standard practice in the design of bank-protection works is first to examine the map of the affected area to determine their presence and usability, and then to examine their toughness and depth. The prominence of an interruption in the symmetry of the shore line is usually a pretty good clue to the last two characteristics, but borings are of course requisite for a complete determination.

Many rivers illustrate the contrasting characteristics of natural streams flowing in sandy and in cohesive materials. In almost every case, however, nature has introduced dissimilarities in other aspects of regimen which tend to obscure the effects of dissimilarities in the feature being investigated. In this respect, laboratory experimentation improves upon nature. At the U.S. Waterways Experiment Station at Vicksburg, model rivers having the same initial cross sections, slopes, and rates of discharge were made to flow through beds of easily erodible materials and through beds of the same material to which a small amount of cement had been added.

It seems well established, from these observations and those in nature, that rivers flowing through cohesionless materials tend to develop into wide, shallow, and steeply sloping streams, while those flowing through fine-grained materials having cohesion are characterized by a tendency to remain narrow and to entrench themselves. In both cases the streams meander by caving in the bends, and this results in a thalweg profile consisting in broad terms of a series of deep pools occupying the bends, and of broad-crested shoals separating them. It is of course the intervening shoals that give concern to navigation. They present a much greater problem in streams that traverse sandy beds and cave their banks rapidly than in those that lie in more erosion-resistant and finer-grained materials.

The source of a shoal is in general erosion in the bend immediately, or a short distance above, and its presence is brought about by the inability of the current in the crossing to continue to transport the burden it has excavated in the bend. In cohesionless, coarse-grained materials, excavation by the turbulence of the impinging currents in the bend is rapid, but the continued transport of this burden after the violence of the attack has spent itself and the change in direction of flow has been effected, becomes a task too great for the carrying capacity of a stream even as large as the Mississippi River, and the coarse part of the load is dropped on the crossing.

In fine-grained, cohesive soils the load acquired in the bend is small because the material is more difficult to erode; and the depth attained is greater because the bank does not tumble into the stream but merely steepens as the river deepens. Moreover, the nature of the particles of which this lesser and more difficultly obtained burden is composed is such that less energy is required to transport them. The result is that the stream is deeper both in bends and through crossings than where the presence of coarse-grained sandy banks precludes great deepening in the bend by reason of the introduction of an excessive sediment load, which in turn largely stops on the crossing.

The principal necessity in the open-river improvement of a stream is, then, to counteract by some means the influence of the erodibility of its banks, which makes for steepened slopes, instability of location, great width, and shoals. Depending upon the volume of low-water flow available, this may entail a contraction of the stream's width or dredging of channels through the shoals at low water. In any case it involves the stabilization of caving bends, both in order to arrest the constant meander which destroys or isolates works of improvement and riparian developments, and in order to diminish the supply of sand which seems to be the source of most of the trouble.

Part V. Navigation Channels Developed by Contraction Works

By Delbert B. Freeman, M. ASCE

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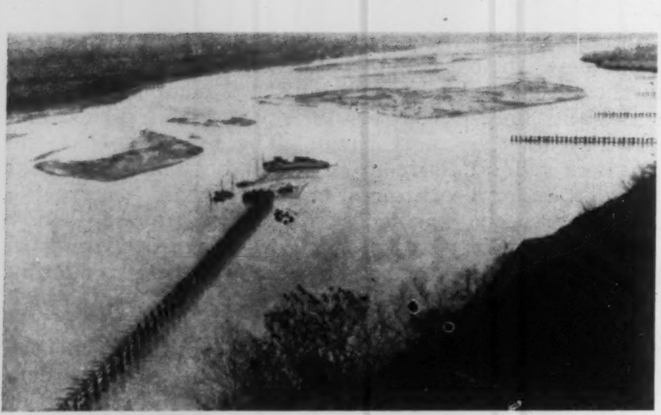
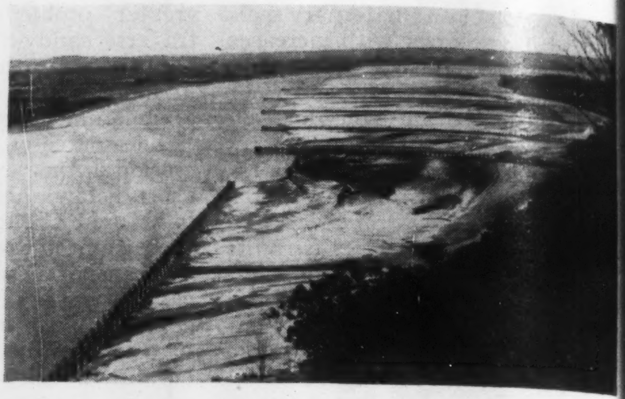
Contraction of the channel is one of the principal features in the development of the Missouri River, which is being improved for navigation from its mouth near St. Louis, Mo., to Sioux City, Iowa, 760 miles upstream. The prime objective is to collect the meandering waters of the numerous channels and confine all the flow to one fixed channel, thus contracting the stream sufficiently so that minimum navigable depths can be obtained with a minimum of dredging. The contracted width to be provided is 1,100 ft at the mouth, decreasing to 700 ft at Sioux City.

In this alluvial stream, which carries a heavy load of sediment during high-water stages, contraction can best be accomplished by installing permeable structures. Permeable dikes allow a considerable flow to pass through them. As the current passes through, its velocity is retarded sufficiently to induce deposition of sediment downstream from the dike. As deposition occurs, an accretion is formed downstream and inshore of the dike, which fills to the elevation of the dike, and the bank is thus moved riverward to complete the contraction. This process of accretion is accomplished over a period of three to ten years. Simultaneously the contracted channel is cleaning itself out, removing middle bars, and increasing its discharge capacity. The contracted channel is fixed in place by bank revetments as may be required.

DESIGN VARIED AS REQUIRED

Variations in structure design are provided to fit all probable combinations of water depths, stream-bed penetration, current velocities, and relative exposure of the structure to damage from running ice or debris but the standard structure found to be most suitable for contraction of the Missouri is a pile-clump dike extending laterally from the high bank out into the stream at a small angle downstream to the designed channel,





(LEFT) SECTION OF UNIMPROVED RIVER AT TIME CORRECTIVE DIKES WERE BEING PLACED. MIDDLE BARS OBSTRUCT NAVIGATION. (RIGHT) SAME SECTION AFTER DIKE SYSTEM HAS CLEARED A NAVIGABLE CHANNEL

or placed longitudinally with the current. The dike consists of a double or triple row of pile clumps connected by a single or double row of pile stringers anchored to the bank by a root structure and ending at the river end in a pile-clump terminal of 9 or 18 piles. The clumps, consisting of groups of 3 piles each driven tripod fashion, are placed 15 or 18 ft apart in each row to a penetration of not less than 20 ft. The piles of each clump are lashed together near the top with wire cable. The clumps of each row are staggered with the clumps of adjacent rows, and the rows are spaced to permit placement of stringers, which are lashed to the clumps 3 to 5 ft below their tops. Where the structure is exposed to the direct attack of the current, it is composed of three rows of clumps driven to a 30-ft penetration. The root section is composed of a single row of piles driven or hand placed to a depth of 6 ft, spaced 6 ft on centers, and staggered so that a stringer may be placed between them.

Prior to placement of the root section, the dike is protected from flanking by grading a 105-ft section of the bank to a 1-on-3 slope, extending approximately equidistantly upstream and downstream from the center line of the dike. The slope is then covered with rock. The toe of the graded bank is protected from scour by a woven willow or woven lumber mattress extending 85 ft riverward, which is sunk to the river bed by stone ballast. The main dike structure is likewise protected from scour by a woven willow or woven lumber mattress, 77 to 89 ft wide, extending the entire length of the structure and 45 ft beyond to protect the terminal from scour.

A small degree of contraction can be obtained by construction of a single, longitudinal, pile-clump structure parallel to the current, but ordinarily the dikes are constructed in groups of 3 to 10 structures with the upstream dike constructed longitudinally to give the initial deflection to the current, the downstream units being placed laterally from the bank out into the stream.

Revetments are constructed along concave banks to stabilize these banks in place. The standard revetment is constructed by grading the bank that has been eroded or dredged to the desired alinement to an even slope of 1 on 3. An 85-ft woven willow or lumber mattress is then constructed progressively downstream along the shore line and ballasted to the river bed with stone. The shore edge of the mattress is placed as near the low-water line as practical; it is anchored with single piles spaced from 5 to 20 ft apart and driven to a penetration of 15 to 20 ft. The bank above the water line is covered with a blanket of cast stone grading in depth from 8 in. at the top of the slope to 15 in. at the bottom.

Contraction of the channel of the Missouri River is closing off the numerous chutes and auxiliary channels and collecting all the normal flow into one channel. Concentration of the energy of flow is removing the middle bars and scouring the channel and crossings to navigable depths. Where depths of 2 to 3 ft were frequently encountered before the construction of contraction works, we are now reasonably certain to find a depth of 6 ft or more in the contracted sections of the river, and the project is not yet completed. The depths obtained to date have resulted from planning for a channel of 6-ft minimum depth. Under more recent authorizations we are now working towards a 9-ft channel.

Part VI. Dredging Methods Compared

By LAWRENCE B. FEAGIN, M. ASCE

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THE two types of dredges in most general use for maintaining and improving the Middle Mississippi navigation channel are the cutterhead and the dustpan.

The dustpan dredge derives its name from the shape of its suction head, which closely resembles the household dustpan or vacuum sweeper. It is used to dredge relatively soft and easily eroded materials, which are predominant in the Middle Mississippi. The suction head is equipped with agitation water jets and a series of openings through which sand and silt, mixed with water, are drawn into the main suction pipe of the dredge and then pumped through a floating discharge pipe back into the river but outside the channel.

This dredge works upstream. It is held against the downstream face of the bar by the operation of winches on the dredge attached to cables anchored upstream of the bar. It cuts a continuous path the width of the dustpan, from 28 to 32 ft, for the entire length of the shoal up to a maximum of about 3,500 ft for one setting. Additional width, to the desired channel dimension, is obtained by making other cuts, dropping back to the downstream side of the bar each time, and proceeding upstream parallel and adjacent to the next preceding cut. Usually a narrow ridge with a top width of about 2 to 5 ft is left between cuts, to be carried away by the current or flattened by passing craft.

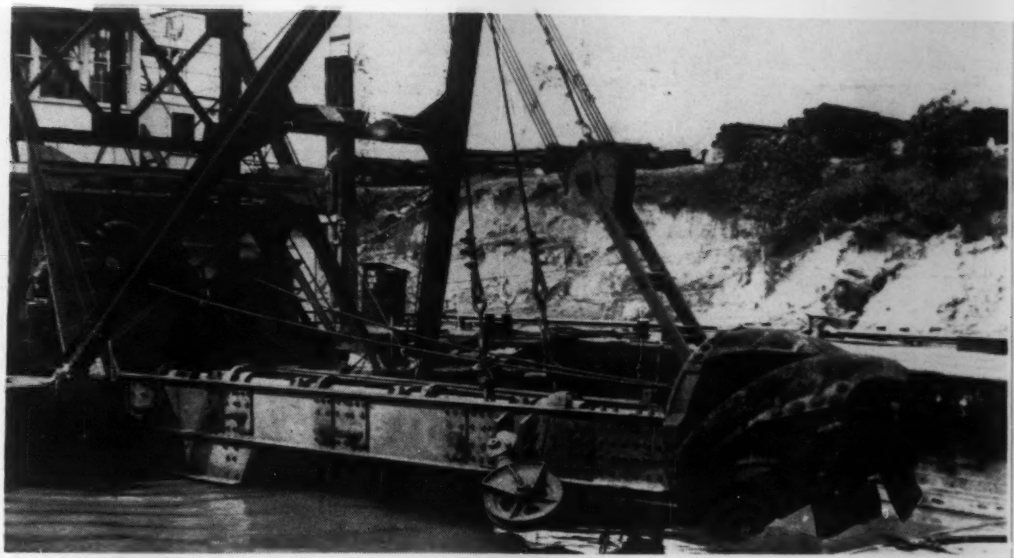
This type of dredge functions most effectively with comparatively short discharge pipe lines—500 to 1,000 ft. It is so powered that efficiency drops rapidly for longer lines or for an increase in lift beyond the few feet required by a floating pipe line. It does not work well in stiff, cohesive materials, in gravel deposits, or against the faces of cuts of such height that undercutting results in burying the suction head and shutting off the supply of water from the suction intake.

Because of the long cables attached to anchors 600 or 700 ft apart, this straightahead-feed type of dredge can readily reach any part of the channel and has little difficulty in getting out of the way of tows which require the whole width of the channel in passing, but has the disadvantage of loss of time in moving back to the foot of the bar for each cut. It has the advantage of depositing its spoil in parallel ridges, distributing it over a relatively large area. This is especially desirable in shallow reaches where there is barely adequate depth over the spoil area to float the discharge pipe. Because of the rapid rate of advance, shore pipe cannot be used effectively for a dredge operating in this manner.

CUTTERHEADS ALSO HAVE ADVANTAGES

The cutterhead dredge is equipped with a suction head which, instead of spreading in the dustpan manner, tapers to a semispherical head equipped with three to six large blades, which revolve and cut into the subaqueous materials so that they can be drawn into the suction pipe and discharged by a centrifugal pump through the pipe line. It is well adapted to dredging resistant and heavy materials and has been called on to pump quantities of loose stone having as its greatest dimension but 4 in. less than the diameter of the discharge pipe, as well as cohesive materials. It can undercut high faces with little fear that the cutterhead will be buried. For this reason it has been especially effective in dredging cutoff channels in the Lower Mississippi River as well as canals such as the intercoastal waterway.

The cutterhead dredge, also known as the swinging dredge, operates by swinging across the cut in about a 250-ft arc, pivotted on one spud located near the stern, with the other spud raised. At the end of the swing, the raised spud is dropped to the bed of the river and the lowered spud is raised; then the operation is repeated in the opposite direction. Thus the dredge simulates walking as it moves forward on its spuds or stilts. The discharge and the other equipment of this dredge are similar to the dustpan type, but in operation the cutterhead works downstream against the upstream face of the bar and completes a cut 150 to 300 ft in width before a thorough channel is available for navigation.



Cutterhead Dredges Remove Heavy, Resistant Materials from Channels and Canals

Both types have single centrifugal pumps with impellers ranging in diameter from 69 to 87 in., powered by either an electric motor or a steam turbine. The cutterhead dredge is efficient up to about a 30-ft head with 2,000 ft of pipe line. Above these limits, efficiency drops rapidly. Because of its manner of operation, it is well adapted for spoiling over the bank through a shore pipe.

The cutterhead dredges, equipped with a 22-in. intake and a 20-in. discharge, cutting a 250-ft width, advance about 35 ft an hour against 3 to 4-ft face. The dustpan dredges, with discharge pipes ranging from 24 in. to 32 in., cutting a 28-ft and 32-ft width, respectively, advance about 300 ft an hour against a 3 to 4-ft face. Both types of dredges have capacities of from about 1,000 to 1,800 cu yd per hour, with the discharge averaging between about 10 and 14% solids. The dredged material usually ranges from 85 to 95% sand, the remainder varying from pea gravel to coarse gravel.

The capacity depends on the type, power and use of the dredge, the composition of the material pumped, and the disposition of the spoil. The dustpan, after making its initial cut, gains the assistance of the river current in the cuts that follow. Also, after the initial cut, most of the waiting boats can proceed, while a cutterhead dredge must complete its entire cut to permit use of a blocked channel. It will usually be found that a 24-hour per day operation of the dredge is most economical. Field costs of channel-maintenance dredging in recent years have ranged from about 5 to 8 cents per cu yd.

That the unit cost is about the same for each type of dredge may be attributed to the fact that each is used in general on dredging assignments for which it is best suited, though under especially favorable conditions the unit costs for the dustpan are usually the lower of the two.

JET NOZZLES

Suction Head of the "Dustpan" Dredge Removes Relatively Soft Materials

Addition of Air-Entraining Agent at Concrete Mixer Advocated

By CHARLES E. WUERPEL

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THE THEORY of the role of widely dispersed air in concrete is given on the basis of technical data and field experience developed by the U.S. Engineer Department and many other agencies. The data on which the presentation is based have been published elsewhere and are referred to in the bibliography at the end of this article. The practical benefits to be derived from properly controlled, purposeful entrainment of air are described with the manner by which they can be best obtained. Emphasis is laid upon the increased requirements for accuracy in the design and control of the plastic concrete mixture.

WIDELY dispersed spheroids of air in concrete will increase the resistance of the hardened mass to frost action and to chemical action by the salts used for de-icing pavements far beyond that achieved with non-air-entraining concrete. It is perhaps less widely accepted that purposeful air-entrainment will benefit concrete structures of other than the pavement type. However, data have accumulated in sufficient amount to satisfy the writer and the U.S. Engineer Department that air-entrainment used with appreciation of its sensitivity is beneficial in all types of concrete.

Some of the concrete placed prior to the era of purposeful air-entrainment may have derived abnormal durability from non-purposeful entrainment of air by the use of cement manufactured in mills where oil-leaking grinding mills or saponifiable matter introduced as grinding aids furnished a medium of air-entrainment.

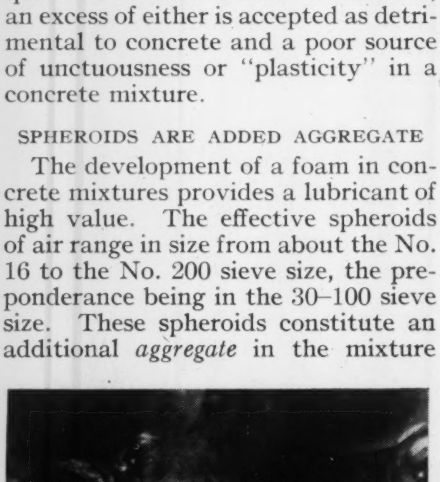
It is at least possible that some part of the answer to the currently mounting controversy over the propriety and desirability of the relatively high fineness of present-day cements may lie in the *type of grinding* used rather than in the fineness as such, since the grinding mills of the oil-leaking type used in the day of relatively coarse cements are being rapidly supplanted by grinding equipment and procedures which preclude the leaking of oil.

That benefits to concrete, regardless of type or usage, may be understood it is necessary to understand the theory of air-entrainment and its effect on concrete. The discussion which follows is presented for that purpose.

Concrete mixtures naturally possess a high coefficient of friction which is lessened rather ineffectually by the cement-water paste. Neither the angular grains of cement nor the water have a high lubricating value. The quantity of water which may be used for lubricating purposes is strictly limited owing to the adverse effect of excess water on strength, cohesion, and durability. The quantity of cement used is limited by factors of economy, heat generation, and volumetric stability. Of the two ingredients—water and cement—it is the cement which is most commonly used in excess over that actually required for cementation. However, an excess of either is accepted as detrimental to concrete and a poor source of unctuousness or "plasticity" in a concrete mixture.

SPHEROIDS ARE ADDED AGGREGATE

The development of a foam in concrete mixtures provides a lubricant of high value. The effective spheroids of air range in size from about the No. 16 to the No. 200 sieve size, the preponderance being in the 30–100 sieve size. These spheroids constitute an additional *aggregate* in the mixture possessing complete flexibility of shape.



SPHEROIDS CONSTITUTE ADDITIONAL "AGGREGATE" in mixture possessing complete flexibility of shape, as shown in this enlarged view of typical non-coalescing spheroids of air entrained in simulated concrete.

Instead of rigid angular and subangular grains of sand or cement which will not accommodate themselves to the movement of other grains of similar or larger size, the spheroids of air greatly facilitate the internal rearrangement and movement of the rigid ingredients in a concrete mixture, and thereby reduce the internal friction, relieving the cement of the job as principal lubricator and enabling it to perform its mission of coating and cementing the rigid aggregate particles, and lessening appreciably the need for water as a lubricant.

Therefore, the initial effect of the entrained air is to reduce the water-of-convenience component of the mixture. Reduction in the quantity of water which is not combinable chemically with cement results in: (1) increased strength of the matrix; (2) reduced capillary and water-channel structure, and consequently; (3) increased durability and minimized migration of water into and out of the hardened concrete.

AIR-ENTRAINMENT SUPPORTS DENSITY THEORY

The stress, which in the past has been laid on increased density in concrete, has been related principally to the problem of reducing the water-of-convenience—the evaporable water or migratory water—in concrete. Since purposeful air-entrainment performs this function better than any other means yet discovered, the practice of entrainment of air is not in contradiction to the *density* theory but acts in support of it. This can be understood only if the spheroids of purposefully entrained air are recognized as being entirely discontinuous non-coalescing particles of an extra aggregate which serve to reduce the damaging continuous phase of channels and capillaries in hardened concrete.

The introduction of what is and what should be accepted as an extra fine aggregate of practically zero coefficient of friction results in a lessened need for the rigid fine aggregate in about the same volumetric proportion. As a matter of fact, the intro-

AIR ENTRAINMENT used with appreciation of its sensitivity is beneficial in all types of concrete. Here air-entrained concrete for West Point Dam, New York, is placed in massive base monoliths.

duction of the spheroids of entrained air makes practically mandatory a corresponding reduction in the quantity of rigid fine aggregate to avoid an "over-sanded" mixture.

AIR-ENTRAINMENT JUSTIFIED

The combined influence of an appreciable reduction in water (0.5 to 1.0 gal per bag of cement) and in rigid fine aggregate results in a more coherent (reduced segregation) mixture of a high order of remoldability and a matrix more resistant to the future migration of water. These factors alone would justify the use of purposeful air-entrainment, but in addition, the resistance of the hardened mass to rupture by internal hydrostatic pressure or ice-crystal growth is greatly enhanced by the provision of a multitude of small reservoirs for the relief of pressure within the mass.

The optimum quantity of purposefully entrained air is approximately 3 to 4 percent of the volume of the mass when coarse aggregate not larger than 2 in. is used. Since there is always air entrained in concrete to the amount of about 1 percent by volume (termed "incidental air" since it is entrapped by the physical action of mixing and coalesces into large bubbles from $^1/_8$ in. to $^1/_2$ in. or larger in diameter), the total optimum quantity of air is specifically limited by the U.S. Engineer Department and by others to 4.5 plus or minus 1.5 percent by volume based on the minus $1^1/_2$-in. component of the concrete. Lesser quantities of air do not develop the desirable qualities in the unhardened or in the hardened concrete. Greater quantities of air contribute little or no more to the desirable qualities, but, because of their appreciable volume, reduce the strength of the hardened concrete.

Numerous laboratory tests have demonstrated that entrained air in the optimum quantity does not reduce the strength-gaining properties of the concrete materially if full benefit is taken, as it should be, of the opportunity to reduce the water and sand content. Similar tests have demonstrated that the bond of concrete to steel is likely to be reduced slightly (not in excess of 10 percent) when the optimum quantity of air is entrained, but the uniformity of bond is improved. It is the writer's belief that the improvement in uniformity of bond completely offsets the possible slight reduction in bond strength, and that reinforced concrete is benefited by the use of air-entrainment.

The entrainment of air and its proper dispersion appear to be more closely associated with the quantity of rigid fine aggregate in the 16 to 50-mesh sieve size than to any other component of the concrete. The fine particles of cement and the minus 100 mesh particles of rigid fine aggregate serve as depressants of air-entrainment while the coarser particles of aggregate have relatively little effect on air-entrainment *except* as the shape and size of the coarse particles affect the requirement of the mixture for water, cement, and rigid fine aggregate.

The association of the entrained air with the middle sizes of the fine aggregate makes the entrainment of air a function of the sand-mortar constituent of the concrete mixture. If it were not that practical difficulties of measurement prevent it, the ideal way to specify and control air-entrainment would be on the basis of the quantity and dispersion of the air in the sand-mortar component of the concrete.

As the size of the coarse aggregate increases, the optimum quantity of total air in the mixture is reduced. From the data available to date, the air content of the mortar and the overall benefit to the concrete can be maintained about equal when the total air content is as shown below for concrete containing various sizes of coarse aggregate:

Coarse Aggregate Max. Size in In.	Total Air Percent
$^3/_4$	5.5
$1^1/_2$	4.5
3	3.5
6	2.5

The physical measurement of the air entrained in concrete is acknowledged generally to be the major obstacle to the degree of control essential to its proper use. Measurement of the air in the mortar component is prevented by the impracticability of separating the mortar from the coarse aggregate by means that will avoid the escape of important amounts of air.

Escape of air permitted by wet-screening processes makes it practically mandatory to measure the air in the concrete as mixed. When the size of the coarse aggregate does not exceed 2 in., this procedure is relatively simple using standard volume measures of handleable sizes. However, in mass concrete mixtures containing 6-in. aggregate the size of the container required is approximately 3.5 cu ft in volume and requires mechanical handling. A number of procedures have been tried experimentally, but none is believed to be superior to the gravimetric (unit weight) method described in ASTM Method C138–44.

The crux of the matter of air-content measurement is obtaining a sample of concrete in the test mold which will be truly representative of the concrete as cast in the structure. The method of measurement after molding in the test container is of relatively lesser importance.

In so far as is now known, the best and most practical procedure is to use the ASTM Method C138–44 with a sufficiently large volumetric mold to minimize chances of non-representation, to exercise extreme care in the sampling of the concrete and the molding of the test piece, and to repeat the test procedure frequently during each day of concreting operations.

The quantity of entrained air in a given mixture of concrete is a complex function of the type of cement (chemistry and fineness); the shape, grading, and quantity of the rigid fine aggregate; the shape, size, and quantity of the coarse aggregate; the temperature of the mixture; the type of mixer used; the time of mixing; the consistency of the mixture when mixed; and the quantity of cement in the mixture.

It is practically impossible to predict with certainty what the air content of a mixture will be from calculations alone. Improvement in the means of controlling the air-entraining characteristic of a cement containing an air-entraining agent, as now specified in ASTM specification for air-entraining cement (C175–46Ta) by the ASTM method C 185–46T has reduced the probability of serious excesses of air in concrete, but close regulation of air content still is not practicable by this means. For this reason the air-entraining agent should be added in the field by accurate, automatic, mechanical means whereby its regulation is in the hands of the engineer.

It is argued by some that the errors potential in "air-entraining cement" are less in the hands of the producer of small or relatively small quantities of concrete than they are when the agent is added at the mixer. It is too early in the field experience with air-entrainment to demonstrate conclusively which means is preferable for general use, but it is indicative of a trend that more and more air-entraining is being accomplished by addition at the mixer. With the further development of accurate and dependable dispensing devices, this trend should become more marked.

IMPROVES ALL TYPES OF CONCRETE

It should be emphasized that purposeful air-entrainment will greatly improve the quality, appearance, and placeability of all types of concrete. The greatest obstacle or drawback to its more general use is the mandatory requirement for greatly increased expertness in the design of the mixture and close control of the quantity of entrained air.

The need for increasingly expert handling of concrete mixtures has become more apparent with all the modern means for improving the quality of concrete—the use of the water-cement ratio theory, the use of high-frequency vibration, the use of absorptive form linings and evacuated concrete surfaces, and now, air-entrainment.

Editor's Note: This paper was presented by the author before the Structural Division at Kansas City.

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Reclaimed Sewage to Replace Ground Water in Los Angeles Area

A REPORT prepared by Harold Conkling and R. F. Goudey, both Members ASCE, for the West Basin Water Association shows that in practically all of the South Coastal Basin of California there is need for additional importation of water and that soon the City of Los Angeles will have reached the limit of its ability to import through the Owens Valley aqueduct.

According to the report, the Colorado River is the only foreign source from which water may now be imported to the West Basin. The only present possible alternative to importation of water from the Colorado River is purification of the sewage discharged from the outfall sewers of the Los Angeles County sanitation districts and the City of Los Angeles, and recharging the ground water of West Basin with the water thus obtained. It is estimated that in 1947 approximately 280,000 acre-ft of water from these outfall sewers is destined to flow into the ocean.

All of the water below the surface of the West Basin at present is there from natural causes. From it are pumped 73,000 acre-ft per annum. Under the plan proposed in the report, reclaimed sewage, treated and sterile, would be forced underground through wells and pumped out by users just as the natural ground water is now pumped.

PURIFICATION IS ASSURED

Although water from the purification plant would be rendered entirely sterile by the treatment proposed, none of the feeder wells would be less than 1,000 ft from any wells tapping the main aquifer underlying West Basin. Most wells would be a considerably greater distance. Thus, even without complete purification at the plant, the water would be freed from bacterial contamination in the long period necessary for it to move from the recharging wells to the extracting wells.

It is assumed that at each recharging well an annual average of 2 cu ft per sec could be put into the ground water, but to be on the safe side it is also assumed that each well would be in use only half the time so that capacity would average only 1 cu ft per sec. This would necessitate 110 wells and permit replenishment of the ground water to the amount of 80,000 acre-ft per year.

The cost of treating the sewage in an activated-sludge treatment plant ($13 million) and storing the treated effluent underground will be but one-third that of obtaining Colorado River water via the Metropolitan Water District, the report says. This tremendous difference in cost suggests the desirability of investigating the sewage reclamation solution further at the policy rather than at the technical level, in spite of the natural prejudice against using sewage when treated and sterilized for domestic consumption.

Copies of the report are available to those who are interested in a detailed study of this project. Requests are to be addressed to Secretary Carl Fossette of the West Basin Water Association, 141 South Pacific Avenue, Rolondo Beach, Calif.

OUR READERS SAY—

Society Speakers at Spokane Defended

To the Editor: I have read with interest the letters in the September issue of Civil Engineering concerning the general ineptitude of the speakers at the Spokane Convention. It is quite evident that the writers of these letters have not had any experience either in procurement of speakers for technical meetings or in the preparation and presentation of papers at such meetings. If they had, I am quite sure their comments would have been less caustic and more charitable.

Curiously enough, both letters conclude on a note to the effect that Local Sections should take on the chore of training their members in the manly art of effective public speaking. My personal reaction to the letters would have been more favorable, if the critics had assured us of their intention to assume the responsibility (*à la* Fred Lavis) for qualifying themselves for public platform appearances when their time comes to take over the performances presently handled so ineptly by their elders.

It could be that the atomic age will bring us professional engineering lecture bureaus from which we may procure trained entertainers at so much per for any and all occasions. When that happy day arrives, our hard-working program committees will no longer merit our sympathetic support and our self-sacrificing members will be able to enjoy the leisure time that might otherwise be devoted to the preparation of technical papers for presentation to captious audiences.

Wm. J. Shea, M. ASCE

Larchmont, N.Y.

Competitive Design Is Held Contrary to Ethics

Dear Sir: A short time ago I received a copy of a manual of design for radiant heating distributed by one of our nationally known manufacturers of copper products. The book is the result of an engineering study made with a view to developing a simple method for designing a radiant heating system. It appears to serve a very useful purpose. Naturally one would expect that such a manual would have been prepared to assist engineers in promoting radiant heating among their clients.

I was quite surprised, therefore, to find an obvious expression of policy in the forward to the book, definitely suggesting that the work of the engineer is a function of the heating contractor. It states that the purpose of the manual is to relieve the contractor of the necessity of solving several simultaneous equations each time he is asked to submit a competitive bid! It also states that this assistance will be of particular value where competition is keen and the contractor cannot afford to price himself out of the picture by conservative design, or take the chance of securing a contract on a scamped design!

I have pointed out to these people that competitive design is not only contrary to the best engineering ethics but a disservice to the owner as well. Competitive bids based on contractors' layouts are not even competitive in price because they are not truly comparable. No two prices are based on the same quality and quantity.

Engineering will continue to be affronted in this manner until the day when thousands of engineers, each acting individually, overcome their inertia and protest. Sitting and grumbling will accomplish nothing.

A. Stuart Collins, M. ASCE
Consulting Engineer

Buffalo, N.Y.

Says that Arc Welding Is Unfairly Attacked

To the Editor: Arc welding has been of decisive importance to America. It did more than most other manufacturing processes in the producing of the tools of war for World War II. It has a record for reliability in billions of welds, made over many years, that is unmatched by any other manufacturing process. However, arc welding is being tremendously handicapped in its application, and there is evidence of still more interference with its future use.

The attack at arc welding is aimed not at the process, as such. It is obvious such tactics would fail. The attack consists in throwing suspicion on the process by writing into specifications expensive and impractical tests that have little to do with the excellence of the weld. Most of these tests have to do with infinitesimal variations of no possible importance, but of great cost. The attack has already eliminated the economic use in many proper applications. If continued, it will soon eliminate many others.

There is, for instance, the ruling that welds must be X-rayed, which increases the cost by several times. Yet the commercially welded joint is always of greater strength than the parent metal and is tremendously stronger than any riveted joint, where X-raying never has been suggested. Riveted joints are usually made tight by calking. This process is accepted without question. The resulting undercut is enormous, yet a welding undercut that is infinitesimal is frequently made the reason for rejection of welds.

We see welds chipped out, rewelded, and welded vessels rejected because of such trifling defects as infinitesimal porosity either on the surface or beneath. Yet parent metal in the same structure with defects much greater, and where weakening would be infinitely more serious, is accepted without question.

We see welding electrode specifications being written, which enormously increase the cost of production with no increase in either the reliability or the excellence of the electrodes. Rivets have no such test to handicap them. While welding electrodes are tested in every conceivable and nonsensical way, no one suggests such tests on a rivet, though the riveted joint is always the weakest spot in any structure. This is never true of a full-section welded joint.

All insured vessels must have their welds X-rayed and any weld is rejected if an infinitesimal defect is found. However, no one X-rays a riveted joint or rejects it because of the voids between the rivets and the rivet holes which are known to be always present.

Because of the higher elastic limit of the weld metal, there is no load that can be put on a welded structure, in which the weld is of equal or greater section than the parent metal, which can affect the weld in any possible way until great distortion of the rest of the structure has taken place. Such distortion would make that structure valueless for its intended purpose, yet all the testing and rejecting cited are mandatory in many welded structures—never in riveted structures.

Welding over the years has done a more reliable job than the rivets it has replaced. The engineering profession, which relies completely on welding in many cases, must recognize and resist the studied attempt being made to eliminate the arc-welding process. The attack has already eliminated the economic use of welding in many structures. The success of such an attack on this tremendously valuable method is neither good advertising for the engineering profession nor good ethics for those involved in the attack. It is time we dealt with reality.

J. F. Lincoln
President, The Lincoln Electric Company

Cleveland, Ohio

SOCIETY AFFAIRS

Air Transport Features Meeting in Kansas City

Annual Fall Meeting Draws Attendance of Seven Hundred

Recognition of the responsibilities of civil engineers in the relatively new field of air transport was accorded at Kansas City at the first session of the new Air Transport Division of ASCE. Emphasis was on the planning and design of airports. This technical conference was a part of the Annual Fall Meeting held from October 16 to 18 in the Hotel Continental, located in downtown Kansas City, Mo. In all, eight Technical Divisions met to discuss matters of special interest to the meeting region. Water supply, river navigation, sanitation, and ground-water use were among the topics.

A large meeting committee, headed by R. N. Bergendoff, arranged for this successful three-day convention. The details that add up to a worthwhile gathering were given special attention—as attested by the remarkable job done by the Housing Bureau headed by Mark Culbreath, in the face of a mighty tight hotel situation. As a result of the work of Mark's committee, many of Kansas City's hotels had the opportunity to become acquainted with the civil engineers. As far as we know, no park benches were pressed into service.

Timely Topics Discussed

As has grown to be the custom, the intellect of those in attendance was served even at the banquets. Thought-provoking was the address by Dr. Donald J. Cowling of the Mayo Foundation, University of Minnesota, before the Wednesday evening dinner crowd. Dr. Cowling's subject was "The Outlook for World Peace." On another occasion, the members' luncheon, Superintendent H. C. Hunt, of the Kansas City public school system, drew upon the factors of "Personal Engineering," which are considered in the educational system. Thursday evening, another dinner and entertainment, featured by distribution of prizes, was addressed by Dr. Kenneth McFarland, superintendent of schools of Topeka, Kans.

Forceful were the arguments of Maj. Gen. H. S. Aurand as he spoke before the opening meeting of the engineers on Wednesday morning. The General, who is Director of the Research and Development Division and a member of the War Department General Staff, defined clearly the responsibility of engineers in the waging of war "when the shooting starts." His address, urging "a mobilization plan for scientists and engineers, as effective as was our industrial mobilization planning for World War II," is printed on page 475 of this issue.

Called to order by John C. Long, president of the Kansas City Section, this general session also featured the appearance of Mayor William E. Kemp of Kansas City, to welcome the Civils. The gratitude of the whole gathering was expressed by President W. W. Horner in his response. To prepare the group for the trips and entertainments in store for the remainder of the week, a movie was presented, showing the spectacular features of Kansas City.

The especially planned Technical Division meetings dealt largely with timely problems of the mid-continent area. Typical was the symposium on Sanitary Engineering Aspects of the Missouri Valley Development. In prepared papers, engineers representing affected states related the particular problems of their own states with regard to the Missouri River development. Each of the Division meetings is reported in a separate account on the following pages. As has always been the case at ASCE sessions, much of the comment and discussion carried beyond the scheduled meeting hours, so that it was not uncommon to find an earnest group in the corridor debating the value of stream reaeration or some similar subject. This inclination roused the curiosity of one of the ladies at the grand ball on Wednesday evening. After being subjected to learned discussions in one group after another she remarked, "You men are amazing! You can scarcely leave off your talk about the new protection of the Panama Canal long enough to listen to Dr. Cowling talk about world peace!"

Entertainment Standard High

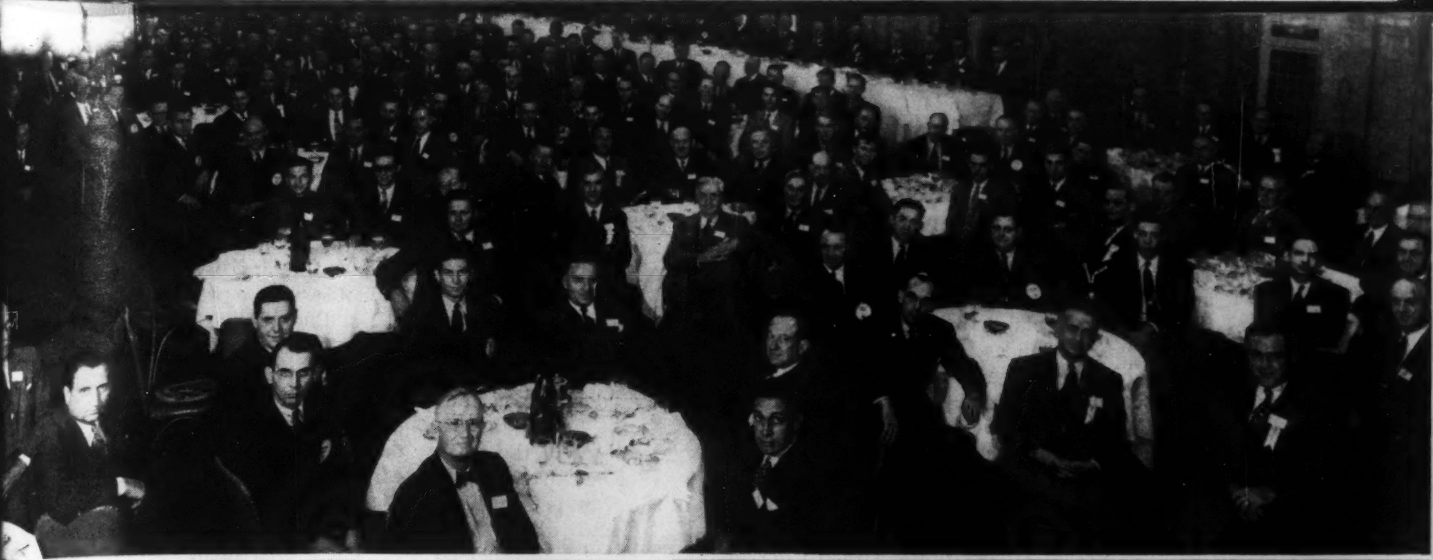
That grand ball, by the way, was an outstanding affair. It is true, of course, that the keynote was the address by Dr. Cowling. However it was noticed that considerable attention was given to the excellent dinner and the pleasant hours of conversation and dancing that followed. Master of ceremonies on this occasion was President John Long of the Kansas City Section.

Many other entertainments were featured, with special attention (naturally) to the women. For their pleasure a series of luncheons and trips was arranged, so that by the time the meeting came to a close, it can safely be wagered that they had tasted the choicest Kansas City tidbits and visited the outstanding attractions of the city.

ASCE Officers Broadcast from Kansas City

Two symposiums were broadcast over the Kansas City Star Radio Station WDAF on Wednesday and Thursday of the meeting week, with officers and directors among others participating. On Wednesday the symposium on the subject, "The Engineer and His Contribution," informed residents of Kansas City and vicinity of the functions of civil engineers in time of war and peace. With Joseph Ivy, past-president of the Kansas City Section acting as moderator, Col. William N. Carey, President W. W. Horner, Vice-President Gail A. Hathaway, and Past-President E. B. Black participated. Colonel Carey told of the work of ASCE; President Horner detailed the activities of the Kansas City Fall Meeting; Mr. Hathaway spoke of the engineers' contribution to his country in time of war; and Mr. Black told of the engineer's work in time of peace.

In the second symposium, with Mr. Ivy again acting as moderator, Vice-President Ernest E. Howard, Past-President John C. Stevens, and Prof. Wilbur M. Wilson, Director, participated. In this presentation, designed to illustrate the engineer's position in world events today, Mr. Howard discussed the engineer's importance in national defense; Mr. Stevens discussed the need for greater utilization of private engineers' talents in planning public works most economically; and Professor Wilson, who was the ASCE observer at the Bikini atom bomb tests, discussed the social significance of the atom bomb in the current efforts toward world peace.



A Look-In on ASCE's Fall Meeting in Kansas City

(1) At the opening-day luncheon. (2) Among those present were, left to right: R. N. Bergendoff, general chairman of the Kansas City Section arrangements committee; Col. William N. Carey, Executive Secretary ASCE; John C. Long, President, Kansas City Section; W. W. Horner, President ASCE; and E. B. Black, Kansas City, Past-President and program chairman. (3) An embryo engineer in bobby socks was among the nearly 200 students attending the Student Chapter Conference. Left to right: Misses Elise Hosten, president of the University of Detroit Student Chapter; Alice Jarvis, vice-present of the University of Minnesota Student Chapter; and Mar Krumboltz, recorder of the Iowa State College Student Chapter. (4) Presidents national and local, welcomed General Aurand (center), principal speaker. (5) Months ahead of scheduled 1947 meetings, host Local Sections begin planning. Gordon Butler (left) and John Girand (right) obtain data from Joseph W. Ivy, Kansas City publicity chairman, for the Duluth Summer Convention and the Phoenix Spring Meeting, respectively.

On two occasions, Thursday afternoon and Friday, they were joined by the "men folks" for trips to points of engineering as well as historical interest. Objectives were the Kansas City Airport, water works, the new Missouri River lift bridge, and the Sheffield steel plant, among others. Transportation, guides, literature, etc., made these trips memorable. As one guide put it, "When we get through with you you'll know Kansas City better than most folks who have lived here all their lives!"

STUDENTS CONVENE

The Fall Meeting provided opportunity for two regional conferences. Local Sections and Student Chapters in the area met to give attention to the business of running their respective groups with ever greater effectiveness. Delegates from 26 Local Sections convened on Monday and Tuesday of the week. Through the pooling of experiences and sharing of ideas, it is expected that even greater accomplishments will mark future Local Section work in the area.

Student Chapters met on Thursday, October 17, to go over such down-to-earth topics as organization of effective programs, incentives to active participation, and the student engineer's interest in community and national matters. Some 200 students were in attendance.

At both of these conferences, unusually interesting speakers delivered timely subjects. Before a Local Section gathering, Director Wilbur M. Wilson, who was the ASCE observer at the Bikini atom bomb tests, advocated a long-range policy to effect a lasting peace. Highlights of Professor Wilson's talk are covered on page 508. President Horner addressed another session. See page 481. The student delegates later in the week heard addresses by H. Roc Bartell, Chief Scout Executive in the Kansas City area; Director Oscar H. Koch, who is the Board of Direction's contact member to the Committee on Student Chapters; and E. L. Chandler, the Washington Representative of the Society.

This report of the Kansas City Meeting would be most incomplete without a tribute to the efforts of the meeting committee working with Mr. Bergendoff. The details to be handled in connection with running one of these meetings are endless. Nevertheless, with a large group cooperating, results justify all their efforts. In justice each participant should be mentioned, but perhaps the gentlemen won't mind yielding diminishing space to a special plug for Mrs. Ansel Mitchell and her ladies, who did a wonderful job of entertaining the visiting womenfolk.

Rebuilding Blighted Areas in American Cities Discussed by City Planning Division

BY EDWIN H. ALLEN, JR., JUN. ASCE, KANSAS CITY, MO.

STATE AND federal assistance is needed by America's cities in their recentralization efforts, if they are to avert bankruptcy, and new ways must be found to tax those who live outside urban centers but earn their livelihood in town, or those who remain will be unable to meet the per capita cost of services.

These were among the conclusions reached and remedies suggested at a clinic held by the City Planning Division on "What Can Be Done to Anchor Downtown Properties and Check the Spread of Residential Properties Beyond City Boundaries?" Frank H. Malley, Buffalo, N.Y., member of the Division's executive committee, presided at the session, and L. P. Cookingham, city manager of Kansas City, was moderator of the round-table discussion that followed the presentation of papers prepared by planners representing the federal, state, city, and consultants' viewpoints.

In stating the problem as the session got under way, John M. Picton, chief planning engineer of the Kansas City Planning Commission, diagnosed that the cities are "suffering from decay, internal pains, poor circulation, congestion, stagnation, hardening of the arteries, and cancerous growths of slums, which should be cut out and replaced with new tissues lest they spread and absorb good areas."

Papers were prepared for the meeting by: Wilson W. Wyatt, Washington, D.C., administrator, National Housing Agency, and expediter, Veterans Emergency Housing Program; Russell H. Riley, St. Louis, Mo., consultant; Leonard A. Bergman, Albany, N.Y., director, Bureau of Planning, New York State Department of Commerce; Earle S. Draper, Washington, D.C., planning consultant, Federal Housing Administration; T. T. McCrosky, Boston, Mass., executive director, Greater Boston Development Committee, Inc.; and Lloyd Aldrich, city engineer of Los Angeles, Calif.

In his paper, Mr. Wyatt expressed confidence that the General Housing bill, known as the Wagner-Ellender-Taft bill, which passed the Senate but failed to come up for a vote in the House, will pass when Congress next meets.

"This bill," the paper stated, "provides for federal aid to communities in rebuilding slums and blighted areas; financial and technical assistance on a 50–50 matching basis for studies of local housing needs and community development; and aids to communities to provide 125,000 units of public housing a year for low-income families, which private builders cannot serve at a profit."

Mr. Bergman's paper, printed in brief on page 477, discussed the efforts of the State of New York to assist cities in rebuilding themselves, stressing assistance in relief of traffic congestion "to make downtown areas more easily accessible for convenient personal contact for business, social and cultural pursuits."

Mr. Bergman's paper stated further:

"The Department of Public Works is now empowered to construct, at state expense, arterial routes through cities, thus relieving the taxpayer of the fiscal nightmare which has been staring him in the face. These routes will not be designed merely to improve pavement surface, nor will they be limited to the simple expedient of increasing street widths. In some cases entirely new routes will be required. Each will be tailor made to fit the needs of the particular community concerned. After thorough local studies have been made and plans have been submitted to local authorities and have received general approval, the various projects will be progressed as men, money and materials are available. The only local cost will be for 50% of whatever right-of-way will be required. The state will pay the rest. In many instances these urban arterial routes and their downtown interchanges will occupy and bring about new uses of existing blighted and decadent areas."

After touching on studies being made by the state of ways to help cities solve parking problems, and discussing the New York State law enabling institutions, such as insurance companies, to invest in housing projects, the paper continued:

"Another important aspect of the regulations which affect the problem connected with rehabilitating the physical structures of our cities pertains to building codes. Obsolete codes, unrevised over the years, may tend to increase the costs of construction and remodeling by their failure to include, though properly tested and scientifically sound, those newer methods, products and processes which have recently been developed. A means should be found for assuring that building codes are kept abreast of the increased tempo of scientific research of these modern times. State officials, because of the interest of the state in the prosperity and well-being of its cities, may well take a great interest in the problem, and the New York State Department of Commerce is in the process of developing an approach to building-code writing which will enable cities to keep their building codes up to date."

Mr. Draper's paper cautioned that in rebuilding blighted areas, cities must plan for a lower density of population, lower percentage of land coverage, and a more open development.

"This, in most situations, will produce less tax return," the paper stated, "since land devoted to public use is non-productive of taxes, and lower population density usually means reduced assessments on capital investments. This clearly points to the necessity for consideration of occupational taxes, sales tax or other taxes that will bring a return from people living outside the city but benefiting from employment therein or from use of the city's facilities."

In his paper, Mr. Riley stressed the need for improving public transit facilities as a means of increasing their use and decreasing the use of private cars, in seeking a remedy for overcrowded streets which contribute much to the decentralization of cities. Of the popular notion that taxes are lower in outlying areas than in the city, Mr. Riley's paper stated: "This is seldom realized over a long period, for eventually the cost of providing improvements and services in the outlying areas to the standards to which the people are accustomed, frequently involves higher taxes than those paid in the large city. It is also fundamentally inequitable for persons living beyond the corporate limits of the cities to utilize and benefit from the facilities of the city without contributing to their improvement and maintenance."

In his paper, Mr. Aldrich narrated how "by adequate construction of street improvements, sewers and public utilities, and their proper maintenance, the city can make the residential areas within the city of maximum attractiveness to residents. Our city requires that subdividers completely improve all streets before the city accepts dedication therefor. Plans for these improvements must meet all city standards, and the improvements are constructed under city inspection."

Mr. McCrosky's paper stressed the cultural advantages offered by the city and stated:

"The challenge of the postwar age is to demonstrate the rebuilding of a large city—to show that that too can be done, not lot by lot nor block by block, but neighborhood by neighborhood."

In a summary session, conducted by Leslie Williams, New York City, secretary of the Division's executive committee, authors and discussers also suggested the following remedies for the decentralization ailments of cities:

Use entire widths of business streets for movement of people and goods and stop artificially narrowing the streets by storing of vehicles.

Increase use of tax-delinquent lands for home building.

Tighten up city zoning ordinances and establish more county zoning ordinances.

Committee on Arrangements for Kansas City Meeting

Seated, left to right: Joseph Sorkin, S. J. Callahan, J. C. Long, R. N. Bergendoff (General Chairman), E. B. Black (Past-President and Program Chairman), A. N. Mitchell. Standing: Mark C. Culbreath, James D. Marshall, G. H. Frieling, Charles A. Haskins, O. W. Anschuetz, E. Kemper Carter, Joseph W. Ivy Melvin Hatcher.

Make widespread use of subdivision regulations with high standards for development.

Establish the policy of not developing additional public facilities until areas now served are fully developed.

Levy an occupational or sales tax on incomes earned in the city by those who live outside, and city sales tax, applicable to all.

Establish metropolitan-wide public works coordinating groups, where federal, state, and local officials would cooperate with private developers.

Prepare master plans for all land uses in metropolitan areas, beginning at the core of the central city and working outward.

In addition to the engineers participating in the discussion, five Kansas City business men were invited to take part. They are: Ward C. Gifford, president of the realty company bearing his name; Fred M. Lee, treasurer and manager of the John Taylor Dry Goods Company; D. K. Jackson, of the J. C. Nichols Development Company; Louis S. Rothschild, head of Rothschild's and Sons; and Albert F. Hillix, an attorney.

Importance of Ground-Water Resources Theme of Engineering Economics Division

By Jasper W. Meals, Jun. ASCE, Kansas City, Mo.

Two papers were presented at the Engineering Economics Division meeting, at which E. W. Bennison, St. Paul, Minn., chairman of the Division's Committee on Economic Importance of Ground Water, presided. In his opening remarks Mr. Bennison stated that, if it could be stated in millions of dollars, ground water would be the most valuable of our national resources.

Wisconsin's late-starting but winning battle to conserve its underground water resources, upon which two-thirds of its population depends for domestic and industrial supply, was described in a paper by L. A. Smith, superintendent of the Madison, Wis., water department. The title of Mr. Smith's paper was "The Need for Legislation and Control of Underground Water Supplies," and it was read by Herbert Moore, consulting engineer of Milwaukee, Wis. A member of the Ground Water Resources Committee of Wisconsin, established in October of 1944, Mr. Smith reported:

"Considerable progress has been made. The Ground Water Resources Committee sponsored two bills which were passed by the Wisconsin Legislature. The first provided that a permit would have to be obtained from the State Board of Health before any person, firm, or corporation would be permitted to drill a well having a capacity greater than 100,000 gal per day. The second bill provided for an appropriation of $10,000 the first year and $15,000 for each subsequent year, to be matched by a similar amount available in the appropriation to the U.S. Geological Survey, to enable this problem to be studied further. The money is to be spent under the supervision of a joint committee of the U.S. Geological Survey and three members of the faculty of the University of Wisconsin."

George S. Knapp, chief engineer, Division of Water Resources of Kansas, Topeka, Kans., presented a report on the economic importance of ground water as related to agriculture.

LADIES' ARRANGEMENTS COMMITTEE FOR KANSAS CITY MEETING

Seated, left to right: Mrs. N. T. Veatch, Mrs. C. A. Haskins, Mrs. Ansel N. Mitchell (Chairman), Mrs. Ashley B. Taylor, Mrs. Ernest E. Howard, Mrs. Josef Sorkin. Standing: Mrs. S. J. Callahan, Mrs. R. N. Bergendoff, Mrs. R. G. Kincaid, Mrs. Melvin P. Hatcher (Vice-Chairman), Mrs. T. J. Seburn, Mrs. John C. Long, Mrs. G. G. McCaustland. Absent when photograph was taken were: Mrs. O. W. Anschuetz, Mrs. J. Q. A. Greene, Mrs. J. W. Ivy.

Navigation by Open-Channel Methods Holds Attention of Waterways Division Session

By WALTER J. WARE, ASSOC. M. ASCE, KANSAS CITY, MO.

CONSIDERATIONS determining whether navigation is to be attained by open-channel methods or by locks and dams occupied the attention of the Waterways Division at a session at which Col. C. L. Hall, New York, chairman of the Division's executive committee, presided. The six papers in the symposium are briefed in this issue, page 489.

Leading off the discussion by the six members of the Society's Committee on the Regulation and Stabilization of Rivers by Open-Channel Work, was Col. Malcolm Elliott, Retired, Corps of Engineers, USA, formerly Division Engineer, Upper Mississippi River Valley Division, St. Louis, Mo., who outlined the considerations on which determinations are based as to the type of work best suited in the case of each individual river. He pointed out how engineers consider the flow characteristics, channel cross section, etc., in each stream studied.

Lorenz G. Straub, St. Anthony Falls Hydraulic Laboratory, Minneapolis, Minn., delivered a paper on "Discharge and Sediment Relationship in a River," pointing out that "a state of change in river configuration is the rule, rather than the exception." He presented data on studies of turbulence designed to assist engineers engaged in like work in establishing the sedimentation characteristics of rivers.

"Alinement as It Affects Open-Channel Methods" was the title of a paper by Capt. Joseph F. Friedkin, Corps of Engineers, USA, U.S. Waterways Experiment Station, Vicksburg, Miss. Touching on the natural alinement, the ideal alinement, and means of approaching that ideal, Captain Friedkin pointed out in his paper, which was read for him in his absence, that "where boats on the Mississippi once had to travel nearly 40 miles to cover an airline distance of nine miles," improvements have been and are continuing to be made. The ideal alinement, the paper stated, would be that in which river bends "approximated the mean size found on a river." On the lower Mississippi, these would have "a radius of curvature of about three miles, although bends of a radius up to five miles do not appear objectionable." Reduction of length of rivers has increased velocities but comparison of towing time before and after the cutoffs were effected shows that such increases have "been more than compensated for by the reduction in distance effected."

In a paper on "Soil Characteristics of Bed and Banks as They Affect Open-Channel Methods of Improvement," Charles Senour, chief engineer, Mississippi River Commission, Vicksburg, Miss., discussed experiments conducted with models of rivers. In the experiments, he stated, small amounts of cement were added to simulated beds of easily erodible materials, and many valuable lessons were learned regarding the difference in treatment required by streams with beds of varying erodibility.

Lt. Col. Delbert B. Freeman, Corps of Engineers, USA, U.S. Engineer Office, Omaha, Nebr., read a paper on "Construction Works." He described dikes and revetments being constructed along the Missouri River and their effect on checking the meandering of that stream, as well as on helping it to help itself obtain a channel suitable for navigation.

"Where depths of 2 to 3 ft were frequently encountered prior to construction of contraction works, we are now reasonably certain to find a depth of 6 ft or more in the contracted sections of the river, with the project not yet completed," Colonel Freeman said in emphasizing that narrowing the river causes it to help dig its own deeper channel. "The depths that have been obtained to date have resulted from the planning for a channel of 6-ft minimum depth. Under more recent authorizations, we are now working toward a 9-ft channel."

Final speaker in the symposium was Lawrence B. Feagin, head engineer, U.S. Engineer Department, St. Louis, Mo., who discussed "Dredging." Of particular interest was his description of a "dustpan" dredge used to remove relatively soft and easily eroded materials.

"This dredge," he said, "derives its name from the shape of its suction head, which closely resembles the household dustpan or vacuum sweeper. The suction head is equipped with agitation water jets and a series of openings through which sand and silt, mixed with water, are drawn into the main suction pipe and then pumped through the floating discharge pipe back into the river, but outside the channel. It cuts a continuous path the width of the dustpan, from 28 to 32 ft, for the entire length of the shoal up to a maximum of about 3,500 ft for one setting."

That the battle against "Old Man River" is making headway was attested by the speaker's conclusions:

"It is apparent that the need for some maintenance dredging will continue, but the dredging requirements should become progressively less in future years as the quantity of eroded material received from tributary streams becomes less, as the erodible banks become stabilized, as the contraction and alinement control by permanent regulating works becomes more extensive and effective, and as flows become more uniform owing to the operation of reservoirs."

First Session of Air Transport Division Spotlights Modern Airport Design Practice

By R. J. SPIEGEL, JUN. ASCE, KANSAS CITY, MO.

MAJOR airports of a design satisfactory for scheduled airline operations are assured by rigorous, step-by-step planning methods. The recent advances in engineering practice which have made this assertion possible were detailed in three papers presented before the new Air Transport Division. Presiding at the session was the chairman of the Division's executive committee, Alfred J. Ryan, Denver, Colo.

Consolidation of terminal facilities of airlines was advised by E. H. Sittner, Kansas City, Director of Functional Engineering, Transcontinental and Western Air, Inc., for economy in both space and operational costs. His briefed paper appears on page 478. "The airlines have tentatively agreed to try out this scheme at several representative airports," he reported. He advised that a second sound consideration of planning engineers should be the "vertical separation of passengers and cargo traffic. This separation should be incorporated in the building design, regardless of centralization or decentralization" of the terminal facilities.

Going further into the economics of airport operation, Mr. Sittner pointed out ways and means to make an airport self-supporting. Often overlooked are the remunerative concessions, "restaurants, souvenir and jewelry shops, news and tobacco counters, public lockers, florist, bank, barber and beauty shop, laundry and cleaning agency, garage and service station, car parking area, and others." In all facilities, he urged, sound functional design rather than "monumental" details should be used.

The design of airfield runways was taken up in two of the papers, presented by W. J. Turnbull, Chief, Soils Division, U.S. Waterways Experiment Station, and by Charles R. Foster, Chief, Flexible Pavements Branch, also of the Station.

Utility of the California Bearing Ratio method of design was discussed by Mr. Turnbull. His conclusion was that with well-trained engineers, the CBR offers the best method available in determining the characteristics of runway base courses. It has been accepted as such by the U.S. Army.

Flexible pavement design was analyzed by Mr. Foster. With the rapidly increasing wheel loads on airplanes—from 10,000 to 150,000 lb in the last ten years—economy in design cannot be realized until a balance is reached between the size of planes and the economical depth of pavement and base. Mr. Foster described tests run at the Waterways Experiment Station which proved conclusively the advantages of using dual wheels on heavy planes. A method for evaluation of the effectiveness of various wheel assemblies and spacings was presented.

Both these papers—by Mr. Turnbull and Mr. Foster—were prepared in connection with their work on the Soil Mechanics Division's Committee on Airfield Foundations.

Military Mapping Subject of Session

By HAROLD M. CLUTE, ASSOC. M. ASCE
KANSAS CITY, MO.

"TECHNICAL Aspects of Military Mapping at the Army Map Service," and "Surveys and Maps in Subdivision Planning" were the subjects of the two papers presented at the Surveying and Mapping Division meeting, over which Joe B. Butler, professor of civil engineering, Missouri School of Mines, Rolla, Mo., presided.

The first-named paper, by Albert L. Nowicki, topographic engineer, operations and planning staff, Army Map Service, Washington, D.C., dealt with the importance of the requirements of maps for military operations and the accuracy of maps for military use as compared with the requirements for peacetime use. Mr. Nowicki concluded his paper by presenting several points of interest concerning the vital mapping needs that would be of immense value to the immediate military mapping effort. The subject was elaborated by Daniel Kennedy, Washington, D.C., chief of the operations and planning division of the Army Map Service, who discussed the problems connected with the distribution of military maps to units in the field of operations.

The second paper, by Richard Y. Jones, Neosho, Mo., dealt with the problems of surveying and mapping in subdivision planning in small cities and suburban areas. R. E. Riddle, Sr., consulting engineer of St. Joseph, Mo., discussed the subject from the standpoint of the small community, and William M. Spann, consulting engineer, Kansas City, Mo., discussed it in relation to the large city.

Sanitary Engineering Division Hears Symposium on Missouri Development

By WILLIAM G. RIDDLE, JUN. ASCE, KANSAS CITY, MO.

"SANITARY Engineering Aspects of the Missouri Valley Development" was the theme of the meeting held by the Sanitary Engineering Division, which was featured by a symposium for which sanitary engineers of states that will be affected prepared papers, each dealing with his own state.

W. Scott Johnson, chief public health engineer, Missouri State Board of Health, Jefferson City, Mo., presided, and presented Ernest Boyce, professor of municipal and sanitary engineering at the University of Michigan, Ann Arbor. Professor Boyce outlined the session's general theme, and the reading of the state sanitary engineers' papers followed. Papers presented included those of Mr. Johnson; Paul D. Haney, chief engineer, Division of Sanitation, Kansas State Board of Health, Lawrence, Kans.; and Ben L. Williamson, assistant engineer, State Department of Health, Des Moines, Iowa.

Melvin P. Hatcher, director, Kansas City Water Department, spoke on "Water Supply Problems of Kansas City," and John B. Dean, division engineer, Supply and Purifying Section, St. Louis Water Division, presented a paper on "Water Works Problems of the City of St. Louis."

Planning and Construction of Major Highways Discussed at Division Session

By CARL L. ERB, JR., ASSOC. M. ASCE, KANSAS CITY, MO.

TWO ASPECTS of current highway problems were analyzed by the Highway Division at its meeting, at which P. H. Daniels, assistant chief engineer, Missouri State Highway Department, presided.

Location of express highways can assist greatly in alleviating traffic congestion in urban areas, said George M. Shepard, Chief Engineer of the St. Paul, Minn., Department of Public Works. However, the smooth functioning of these main arteries, he pointed out, is dependent upon their integration with other facilities such as parking areas.

The second paper on the program, presented by A. A. Anderson, Manager of the Highways and Municipal Bureau of the Portland Cement Association, dealt with improved practice in the construction of highway expansion and contraction joints. The conclusion reached by Mr. Anderson indicates that "where a pavement is constructed with materials having normal expansion characteristics, very little or no provision for expansion need be built into the pavement." This is permissible, however, only when "infiltration is prevented by carefully maintaining contraction joints."

Mr. Anderson went on to show that contraction-joint practice needs special attention, for if such joints are "properly spaced, sealed and maintained, intermediate cracking caused by the combined action of tension, warping and load stresses" can be controlled.

Structural Division Meeting Features Paper on Air Entrainment in Concrete

By F. M. CORTELYOU, JR., JUN. ASCE, KANSAS CITY, MO.

PAPERS on the use of air-entraining admixtures in concrete and on the design of monumental structures were presented at the session of the Structural Division. The presiding officer for the session was Arthur J. Boase, Chicago, member of the executive committee of the Division.

The proper use of air-entraining admixtures in concrete is beneficial in all types, according to Charles E. Wuerpel, chief of the Concrete Research Division of the U.S. Waterways Experiment Station. Listing the advantages of a concrete containing widely dispersed spheroids of air, Mr. Wuerpel expressed the opinion that the most desirable method of adding the air-entraining agent was "in the field by accurate, automatic, mechanical means whereby its regulation is in the hands of the engineer." As the understanding of the properties of concrete increases, he pointed out, there is ever greater need for expert handling of mixtures in design, mixing, and placing. This paper is printed on page 496 of this issue.

The Structural Division also heard papers on the design of two river-control structures. Design features of the Harland County Dam were outlined by L. G. Fiel, Engineer in the U.S. Engineer Department at Kansas City. Following this paper, Wendell E. Johnson, U. S. District Engineer Office, Omaha, Nebr., told of the Fort Randall Reservoir Project.

Gail Hathaway Guest of British Engineers

DURING a recent stay in London, Gail A. Hathaway, Vice-President ASCE, strengthened the bond of understanding between American and British engineers in the course of conferences with officers of the Institution of Civil Engineers. Quite similar problems are being faced by the two organizations, especially in regard to unionization of engineers and improvement of their economic status, Mr. Hathaway told the Board of Direction at its October meeting in Kansas City. The British engineers are following the efforts of ASCE and EJC very closely.

Special courtesies were extended to Mr. Hathaway by Sir William Halcrow, president, and E. Graham Clark, secretary, of the Institution of Civil Engineers. Housed in the Institution's magnificent building, just across the street from the Cabinet Offices, is an excellent library which was put at the service of Mr. Hathaway during his official assignment as engineering consultant on development of water resources in the Middle East for the Cabinet Committee on Palestine.

Copies of Model Law Available on Request

COPIES of the 1946 edition of the Model Law for the Registration of Professional Engineers and Land Surveyors have been received from the printer. This edition supersedes the one published in 1943, and is a result of a conference of official representatives from a dozen interested societies, held at Society Headquarters on August 28, 1945. Formal approval and endorsement of the 1946 Model Law has been given by the governing boards of these twelve societies, and one other whose representative was unable to participate in the conference. The endorsing societies are as follows:

- American Society of Civil Engineers
- American Institute of Mining and Metallurgical Engineers
- American Society of Mechanical Engineers
- American Institute of Electrical Engineers
- Society for the Promotion of Engineering Education
- National Council of State Boards of Engineering Examiners
- American Institute of Consulting Engineers
- National Society of Professional Engineers
- American Association of Engineers
- American Society of Heating and Ventilating Engineers
- Society of Naval Architects and Marine Engineers
- Illuminating Engineering Society
- American Institute of Chemical Engineers

In addition, approval of the new definition of "Professional Engineer" and "Practice of Engineering" has been recommended to the Canadian Associations of Professional Engineers by the Dominion Council of Professional Engineers.

Copies of the 1946 edition of the Model Law have been sent to the members of the 47 state and 3 territorial boards of examiners. A copy for information has also been sent to the president of each Local Section of ASCE. Copies may be obtained upon request to the Executive Secretary at Society Headquarters.

Questionnaires Are Due by November 15

MEMBERS who have not yet returned the questionnaire in the survey on the economic status of the engineer, being conducted jointly by Engineers Joint Council and the U.S. Department of Labor's Bureau of Labor Statistics, are urged to do so before the November 15 deadline.

As stated in the September issue of CIVIL ENGINEERING, the questionnaire is not "just another government questionnaire." It is a study being made by an EJC Committee of Engineers on which the American Society of Civil Engineers, the American Institute of Mining and Metallurgical Engineers, the American Society of Mechanical Engineers, the American Institute of Electrical Engineers, the American Institute of Chemical Engineers, and the National Society of Professional Engineers are represented.

The Board of Direction urges every member to answer the questionnaire. This is a survey developed by engineers, for engineers. The results are to be analyzed and reported on by an expert employed by the engineering societies. The Bureau of Labor Statistics, at the request of EJC, is helping the engineering profession to gather pertinent educational and economic facts about itself. The Engineers Survey Committee needs an answer to every inquiry in order to develop the best possible analysis.

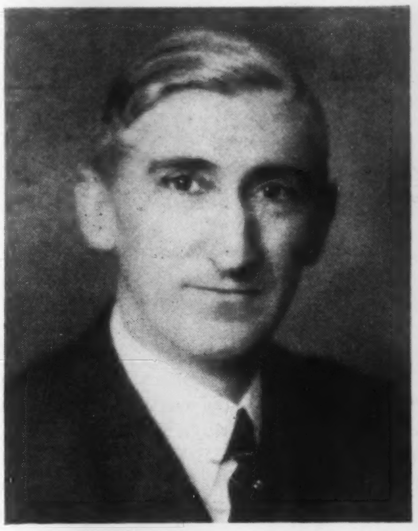
If you haven't sent in your questionnaire, you should do it now. November 15th is the deadline.

E. M. Hastings Is Nominated for President

Edgar Morton Hastings, Richmond, Va., chief engineer of the Richmond, Fredericksburg and Potomac Railroad Company, was nominated for the 1947 President of the Society at the fall meeting of the Board of Direction in Kansas City. Long a member of the Society, he served as vice-president in 1943 and 1944.

A graduate of Baltimore City College and Baltimore Polytechnic Institute, Mr. Hastings spent his entire professional life in the field of railroad engineering. He has been associated with the Richmond, Fredericksburg and Potomac Railroad since 1903, and has been chief engineer since 1922.

Under his supervision in this capacity, several of the bridges over the tidal estuaries emptying into the Potomac were built and rebuilt. These presented unusual difficulties as to footings and foundations. Also, during his term as chief engineer, the new Fredericksburg improvements, consisting of a concrete viaduct through the city of Fredericksburg and a concrete arch bridge across the Rappahannock River, were built. The company is now constructing a new high-level bridge across Aquia Creek, which will cost over a million dollars.



E. M. Hastings, M. ASCE
Nominee for President, 1947

Mr. Hastings' association with the Society dates back to 1910, when he was elected an Associate Member. He became a Member in 1922. In addition to serving the Society as vice-president, he has been a member and chairman of the Committee on Student Chapters and a member of the Executive Committee of the Engineering Economics Division. During the time he was on the Society's Board of Direction, he was also chairman of the Committee on Technical Procedure and Division Activities.

He has been active in the Virginia Section, having served as Section president for two years, and for many years as Contact Member for the Section to the Student Chapter at Virginia Military Institute. In tribute to his work with the young men at V.M.I. he was made an honorary member of the Institute's class of 1918.

Railway engineering groups have naturally claimed much of Mr. Hastings' time and interest. He has been particularly active in the American Railway Engineering Association, as director, vice-president, and president, and a member of the board of directors, in which capacity he still serves. He has also been interested in the civic welfare of the city of Richmond, having served as chairman of the Board of Zoning Appeals of the city and as chairman of the City Planning Commission, which developed a long-range plan for the future development of the city. However, during the war period, increased duties with the railroad forced him to resign from these activities.

Mr. Hastings will take office at the Society's Annual Meeting in New York in January. A more extensive biography of his career will appear in a later issue of Civil Engineering.

Meeting of Board of Direction, October 14, 15—Secretary's Abstract

The Board of Direction held its fall meeting in the Continental Hotel in Kansas City, Mo., on October 14–15, 1946. The meeting was called to order on the 14th by President Horner. All members of the Board were present: Past-Presidents Stevens and Pirnie; Vice-Presidents Howard, Hathaway, Harrington, and McNew; Directors Bryan, Critchlow, Crum, Gamble, Gardiner, Glidden, Haertlein, Hardesty, Hollister, Huie, Koch, Panhorst, Piatt, Saville, Shannon, Thomson, Tipton, Tolles, Wilson; Executive Secretary Carey and Treasurer Trout.

Four Honorary Members Elected

The Board elected the following Members as Honorary Members: LeRoy K. Sherman of Chicago, Asa W. K. Billings of Brazil, Albert P. Greensfelder of St. Louis, and Charles B. Burdick of Chicago.

Technical Divisions Budget Plan

For future determination of the Annual Budget for Technical Divisions, the Board decided that direct advice from the Committee on Division Activities would be desirable. The Committee on Division Activities was directed to formulate a definite plan to effectuate this procedure and to present it to the Board of Direction at its January 1947 meeting.

Military Services Dues Cancellation Policy

With the ending of the war and the recent increase in pay scale of members in military service, the Board decided that its policy for cancellation of dues for men in military service should now be discontinued. This cancellation policy has been in effect throughout World War II. The Board directed that it be terminated at the end of the present dues year, December 31, 1946.

Report of Committee on Employment Conditions

The Board adopted a report by the Employment Conditions Committee, outlining a policy on labor relations to be recommended to Engineers Joint Council with a view to its adoption by the Council. This policy statement restated the three fundamental principles for remedial labor legislation which the Society presented last July to a special committee of Congress then considering remedial legislation. See page 511 of this issue for details. The Board approved a proposal that the Society stand ready to pay its share for the publication and circulation to Members of ASCE of a new manual on collective bargaining practices as they concern professional engineers. This manual is now being developed through a committee of Engineers Joint Council, and Part I of the manual is nearly ready for printing.

Report of Committee on Salaries

An interim report by the Committee on Salaries was adopted by the Board. This report sets up brief job classifications for the several grades of professional engineering employment and the appropriate annual salary range to cover each classification. See this issue of Civil Engineering, page 510.

Budget and Proposal to Increase Dues

Confronted with an annual budget for the fiscal year 1947 which, after every possible reduction, still contained a $55,000 deficit, the Board discussed at length the problem of increasing Society income or the alternative of reducing Society activities materially. The deficit budget was approved, and the Board recommended for consideration by the membership a proposal that annual dues of Corporate Members be raised in the amount of $5 and those of Juniors $2.50. A constitutional amendment is required in order to put such a recommendation in effect, and the Board decided that the problem should be placed in the hands of all Local Sections for thorough discussion, consideration, and conclusion. See this issue of CIVIL ENGINEERING, page 515.

Application and Induction Procedure Simplification

A committee was appointed to study the Society's procedure for applications to membership with a view to devising a simpler procedure. The committee will consist of Vice-President Harrington, chairman, Directors Critchlow and Huie, with two members of local qualifications committees not yet selected.

Future Meetings

The Board approved recommendation by the Committee on Meetings that the Society accept the invitation of the Duluth, Minn., Section for the Summer Convention in July 1947, and of the Louisiana Section for the Fall Meeting of the Society at New Orleans in October 1947. As previously announced, the 1947 Spring Meeting of the Society will be held in Phoenix, Ariz., in April.

Local Section Meetings

The Board decided that any Local Section meeting at which the principal topic of the meeting is one covering Society affairs, such as a meeting to discuss Engineers Joint Council, increase of dues, or matters of like import, would be considered as a "Technical Meeting" of the Section within the purview of the formula for Local Section allotments. The Board recommended that the Committee on Local Sections investigate the practicability of recommending to Local Sections covering large areas, sparsely populated, that such Sections be subdivided into branches or subsections.

Appointment to Executive Committees of Technical Divisions

Upon recommendation of the respective Technical Divisions, the Board appointed a member to the executive committee of each Division to succeed members of such committees whose terms expire in January 1947.

DIVISION	APPOINTEE
Air Transport	C. J. McCarthy (to serve for 1947)
City Planning	No appointment
Construction	Elmer K. Timby
Engineering Economics	Louis Mitchell
Highway	Wm. N. Carey, Jr.
Hydraulics	Lorenz G. Straub
Irrigation	John S. James
Power	J. P. Growdon
Sanitary Engineering	A. H. Wieters
Soil Mechanics and Foundations	O. J. Porter
Structural	Jewell M. Garrelts
Surveying and Mapping	Henry W. Hemple
Waterways	Max C. Tyler

Director Wilson Talks on Bikini Atom Tests

A TWO-PART policy for America in her pursuit of peace was advocated by Director Wilbur M. Wilson, one of the observers at the Bikini atom bomb tests, in an address at the Local Section luncheon in Kansas City on Monday, October 14.

One part of the policy should become effective now, and the other for the "future long-time period following the peace which, it is hoped, will soon settle the present period of unrest," Professor Wilson said.

For the immediate future, he advocates:

Maintain our armed forces in a high state of readiness.

Encourage our representatives in the United Nations to conduct negotiations with firmness, courage, and tolerance but on the highest possible plane of statesmanship.

Be liberal in granting minor concessions, but stand firm on fundamental principles.

For the permanent policy, Professor Wilson advocates:

Do everything possible as a nation to make the United Nations a success as an instrument for peace and justice.

Promote large-scale acquaintanceships among the citizens of various nations by arranging for an interchange of mechanics, students, professors, scientists, and government personnel (this to be done on a scale that would involve at all times a total of several thousand men).

Create an international university on a graduate level to teach statesmanship, this university to be manned by professors from the various nations. Encourage each nation to provide liberal fellowships for a considerable number of its citizens.

So conduct our international negotiations that no country, especially no small country, could accuse us of being unfair in either our political or business negotiations.

WILBUR M. WILSON
Society Representative at Bikini Tests

Be liberal to the point of charity to countries less liberally endowed by nature than our own.

Provide liberally for research in the humanities as well as in the physical sciences.

Maintain a highly developed national armed force of moderate size, and favor an international armed force to be under control of the United Nations.

As individuals, quit chiseling and develop the personal qualities that we advocate for others.

Special Lecture Now Available to Students

THROUGH THE generosity of D. B. Steinman, M. ASCE, the Society now has available for Student Chapter use an illustrated lecture that has been prepared from his notable book, *The Builders of the Bridge*. As is well known, Dr. Steinman's book tells the story of the Roeblings and the building of Brooklyn Bridge.

Excerpts from the book comprise the text of the lecture, which preserves the spirit and drama of the original. In addition to the text and slides, there is a special radio transcription, made by the Radio Corporation of America, of Du Pont's coast-to-coast program, the Cavalcade of America. Standard record players can be used to present the transcription.

As is the case with other Student Chapter lectures, no expense will be incurred in borrowing Dr. Steinman's lecture, the Society paying the shipping charges both ways. As announced in the October issue, a request to Society Headquarters, reserving lectures, should be made well in advance of the date of presentation.

Local Sections Have Responsibility in Solving Professional Problems

By W. W. Horner, President ASCE

(Continued from page 481)

ing the matter of desirable changes in membership grades. This is an important matter, and it is a good thing to have done. I hope that it will be cleared up quickly so that both the conferences and the Local Sections themselves may concentrate on other matters of more urgent importance to the Society and to the profession.

The matter of membership grades will shortly be brought back to the members in the form of a specific questionnaire, and as this questionnaire is sent to the individual members, the Local Sections' officers will be requested to see that these questions become the subject of discussion in Local Section meetings. It is difficult for the individual member to reach a sound answer to questions such as are being asked. There is a real need to discuss them between members, and the Local Section program offers this opportunity.

SOCIETY INCOME

In all probability this same questionnaire to the members will raise the question of increased Society income versus curtailment of activities. Your Board for the third year has adopted a budget which is in the red. This past year's operations actually ended slightly in the black, but only because current national conditions did not permit the carrying out of all of the programs originally adopted.

Obviously, we cannot go ahead with a financial program involving an annual depletion of our reserves. There would be a quick end to any such scheme. All of our costs, like all of everyone's costs, have increased in both salaries and supplies, but in addition to this, this postwar period has brought many strong demands for specific activities not heretofore undertaken.

We face now the question of policy, namely, is our membership prepared to contribute more of our cheaper dollars to permit the services of the Society to be continued and somewhat expanded? This is certainly a question on which the membership needs full information, and an opportunity to give a constructive answer, and such an opportunity can only be available through presentation and discussion in Local Section meetings.

PROFESSION IS NATURAL RESOURCE

In the field of our expanding activities, including service to the public, I have recently written to the Local Section officers in the matter of Engineers Joint Council. This joint activity of the five great national societies has resulted not only in important service to the engineering profession, but in such service to the public as to cause the *New York Times* to characterize the engineering profession as a "national resource." I have felt that it was a matter on which our members should be fully informed, and that the national officers should have the reflection of member opinion as to how far this work might or should be further stimulated.

COLLECTIVE BARGAINING

At the Local Section Conference in Philadelphia I suggested a nine-point program of Local Section activity along lines which I had hoped would greatly increase the opportunity for the individual Society member to participate in the work of the profession and in the work of the world. At the Spokane Local Section conference I presented in some detail my reaction to the current labor movement under which many of our members are finding themselves absorbed within the ranks of labor organizations in which they have no interest, and without their desire or consent.

At that time I suggested a tenth element for the Local Section program in the hope that all Local Sections which have not heretofore had to face this critical situation of their members might inform themselves as to the possibility of such occurrence and might develop specific suggestions to offset this trend.

The Local Sections Conference submitted three resolutions to the Board at Spokane, of these the Board adopted the first, and referred the second and third to our representatives on Engineers Joint Council. These last two are on the agenda for the next meeting of Council.

Resolution No. 1 reads as follows:

That the Board of Direction of the ASCE vigorously recommend to the Local Sections that each Section investigate the best means of obtaining adequate representation of all professional engineers at the Local Section level in matters of common professional interest including collective bargaining and employment conditions.

This resolution, as worded, is somewhat ambiguous and does not give a clear indication of what the conference had in mind. My understanding of the real intent of this resolution involved possibly the following steps:

1. Supplying the Local Sections with information as to what is occurring in many localities with respect to the forced inclusion of professional engineers, either directly in non-professional unions or in collective bargaining units dominated by non-professional members.

2. An exploration by the Local Section of how the professional engineers of any region, who desire to do so, might organize themselves or unite to carry on a campaign to protect their members against this situation.

3. Two phases of this situation would appear to need particular attention:

(*a*) That under which the professional status of engineers is placed in jeopardy through collective bargaining procedure under the NLRB. It has been shown elsewhere that this situation may be sometimes taken care of by assisting the affected individuals in forming their own bargaining groups. However, there may possibly be another line of action in the form of a campaign directed toward management, particularly where the engineering profession has representatives in management, to induce it to understand the importance of maintaining the independence of professional employees.

(*b*) An entirely separate set of situations growing out of secondary boycotts, and forced organizational drives. These matters appear to be entirely outside of any legal framework. A typical situation is that which developed at Venice, Ill., and which has been described by President Brooks of the St. Louis Section. The question here is to determine whether any form of organized action by the engineering profession in the region can be made effective against such situations; if so what.

I have asked that resolution No. 1 of the Spokane Conference be put on the agenda of this conference, hoping that this conference can give the matter further consideration and develop a proposal in more concrete form and in more detail, so that it may be readily understood by those Sections which fortunately heretofore have not faced such situations. It is recognized, of course, that some of the Sections have already been deeply involved in these matters. Even these Sections, however, might well review their experience and see if there are concrete suggestions which they can originate and which might be of general applicability.

MUST BE HANDLED LOCALLY

This whole matter is clearly one that must be handled on the local front, if it can be handled by the professional engineers at all. It is obvious that no national committee and no staff member of the Society can provide the direct action which would appear to be needed. Can the Local Sections or their Regional Joint Councils develop an approach to this situation?

Interim Classification and Compensation Plan Revised by Board of Direction

REVISION of recommended classifications and salaries for professional civil engineering positions was authorized by the Board of Direction of ASCE at its Fall Meeting in Kansas City in mid-October. Action was taken on recommendation of the Committee on Salaries, which submitted an interim report superseding its report made at the July meeting of the Board. In altering the classifications and salaries, last acted upon by the Board in July of 1944, the Board pointed out that it should be noted that the classifications now recommended differ from those approved in 1944. The new classifications now recommended virtually parallel the Federal Professional series, whereas those adopted in 1944 differed by one grade from the Federal grades. The report as adopted follows:

THE Committee on Salaries herewith reports to the Board its recommendations for the revision of classifications and salaries as set out in the Classification and Compensation Plan adopted by the Board July 18, 1944.

This is an interim report inasmuch as other matters, in addition to classifications and salaries, will be reported on at a later date. It is intended to supersede the report on salaries filed with the Board on July 15, 1946.

FOREWORD

Professional civil engineering positions should be classified according to the relative importance of duties to be performed and to the responsibilities incident thereto. In this report, therefore, a general specification has been established for each classification and is intended to describe the duties and requirements usually associated with the classification and the qualifications expected of the person properly to perform the work and to assume the responsibilities specified.

It is expected that in applying this plan to organizations which do not have employees in all of the nine classifications, due consideration will be given to the appropriate relationship of the various positions which exist in such organizations, and the duties and responsibilities of such positions.

Also, in large organizations, where engineering training is considered desirable for the managerial staff, men with engineering training and experience will occupy positions which are not primarily engineering in character. These positions many times will carry salaries that are compensation in part for managerial functions. These positions should not be assigned engineering grade. The responsible engineering head of a large organization will in general be considered Grade IX.

CLASSIFICATION PLAN FOR PROFESSIONAL CIVIL ENGINEERING POSITIONS

This plan includes all classes of positions the duties of which are to perform routine, creative, advisory, administrative or research work which is based upon the established principles of the civil engineering profession, and which require professional, scientific, or technical training equivalent to that represented by graduation from a college or university of recognized standing.

GRADE I

Grade I includes all positions which involve, under immediate supervision, the performance of simple and elementary civil engineering duties requiring professional training, but little or no experience.

GRADE II

Grade II includes all positions which involve, under immediate or general supervision, individually or with a small number of subordinates, the performance of civil engineering duties requiring professional training, previous experience, and to a limited extent the exercise of independent judgment.

GRADE III

Grade III includes all positions which involve, under general supervision, individually or with a number of subordinates, the performance of civil engineering duties of substantial difficulty and responsibility, requiring professional training, previous experience, and independent judgment.

GRADE IV

Grade IV includes all positions which involve, under general supervision, individually or with a number of subordinates, the performance of difficult civil engineering duties or the supervision of a subdivision of an engineering organization, requiring professional training, previous experience, recognized leadership, and independent judgment.

GRADE V

Grade V includes all positions which involve, under general supervision, individually or with a number of subordinates, the performance of difficult civil engineering duties or the supervision of a division of an engineering organization, or the direction of a staff on investigative studies, research and testing, design, or construction, requiring professional training, previous experience, recognized leadership, and independent judgment.

GRADE VI

Grade VI includes all positions which involve, under general direction, individually or with a number of subordinates, the performance of difficult civil engineering duties or the supervision of a division of an engineering organization, or acting as the principal assistant to the head of a division of a large engineering organization or the direction of a staff on investigative studies, design or construction requiring professional training, successful experience in engineering work.

GRADE VII

Grade VII includes all positions which involve, under general direction, individually or with a number of subordinates, the performance of important civil engineering duties or the supervision of a division of a large engineering organization, or the direction of a staff on investigative studies, design or construction, requiring professional training, extensive successful experience in engineering work with demonstrated aptitude and capacity for increased responsibilities in managerial and executive functions.

GRADE VIII

Grade VIII includes all positions, such as:

(*a*) the assistant to the technical and administrative head of an important engineering organization; or

(*b*) the technical and administrative head of a lesser engineering organization; or

(*c*) positions involving the development, analysis, and evaluation, for final executive action of difficult and complex engineering projects with respect to their feasibility, cost, economic justification, and public necessity or convenience.

GRADE IX

Grade IX includes all positions:

(*a*) such as, the administrative and professional head of an important engineering organization with full authority and responsibility for conceiving and executing all the plans and functions of the organization, directing an administrative and professional engineering staff engaged in varied important projects; or

(b) positions requiring highly specialized professional engineering or scientific ability.

PROPOSED ANNUAL AND MONTHLY COMPENSATION FOR THE ABOVE NINE GRADES

(1) GRADE	(2) ANNUAL	(3) MONTHLY (Nearest dollar)
I	$ 2,700 3,400	$ 225 283
II	3,400 4,200	283 350
III	4,200 5,100	350 425
IV	5,100 6,100	425 508
V	6,100 7,250	508 604
VI	7,250 8,600	604 717
VII	8,600 10,350	717 862
VIII	10,350 12,600	862 1,050
IX	12,600 and up	1,050 and up

Our Committee recommends the adoption of the above-described classifications and the proposed salaries applying thereto.

Respectfully submitted,
STERLING S. GREEN
PAUL WEIR
E. B. BLACK, *Chairman*
Committee on Salaries

Labor Policy Adopted by ASCE Directors Calls for Modifications in Wagner Act

A THREE-PART statement of policy regarding employer-employee relations in professional employment was adopted by the Board of Direction of ASCE at its Fall Meeting in Kansas City.

"The American Society of Civil Engineers advocates and affirms that labor relations law should provide for collective bargaining between employers and professional employees," the policy states, but it adds that such bargaining should be "in accordance with the following fundamental principles:

"Any group of professional employees who have a community of interest and who wish to bargain collectively should be guaranteed the right to form and administer their own bargaining unit and be permitted free choice of their representatives to negotiate with their employer.

"No professional employee, or group of employees, desiring to undertake collective bargaining with an employer, should be forced to affiliate with or accept membership in any bargaining unit which includes non-professional employees, or to submit to representation of such group or its designated agents.

"No professional employee should be forced against his desire, to join any bargaining unit or other organization as a condition to his employment or to sacrifice his right to individual, personal relations with his employer in the matter of employment conditions."

The policy was adopted on recommendation of the Committee on Employment Conditions. In addition to the foregoing, the policy adopted states: "Recognizing that existing labor laws as administered are not in accord with the foregoing fundamental principles, it shall be the policy of the Society to exert every appropriate effort toward modification of existing labor laws and their administration to the end that the foregoing principles shall prevail."

The Board reaffirmed its previously expressed policy that "the Society shall give all practicable assistance to its members in the field of collective bargaining in so far as funds, staff facilities and legal limitations will permit."

Vice-President Gail A. Hathaway, Washington, D.C., is chairman of the Committee on Employment Conditions, and Director F. W. Panhorst, Sacramento, Calif., is vice-chairman. Other members are Clarence D. Bowser, Columbus, Ohio; Sterling S. Green, Los Angeles, Calif.; C. W. Okey, Knoxville, Tenn.; and Ernest J. Whitlock, New York, N.Y.

Included in the Committee's report was the following statement:

"The Committee is concerned with the growing tendency toward the use of secondary boycotts to force engineering employees into unions and to compel engineer employers to sign union or closed-shop agreements. Refusal on the part of engineer employers to comply with union demands has resulted in employer members of our Society being forced out of business."

In addition to adopting the statement of policy for ASCE, the Board discussed a recommendation of the Committee that changes be recommended to Engineers Joint Council for the statement of labor policy which that organization is in the process of drafting for consideration by its five constituent societies (CIVIL ENGINEERING, July 1946, page 316). When the EJC policy is formulated to the satisfaction of the constituent societies, the ASCE Committee on Employment Conditions recommended, EJC should "exert every appropriate effort to obtain remedial legislation in the interest of professional engineers."

Comparison Made with Former ASCE and Federal Employees' Salaries

THE following table compares the salaries recommended by the Board of Direction at this time with those recommended two years ago, and with Federal rates as revised in July of this year.

Two years ago the Board of Direction recommended these salaries. For grades of equivalent duties and responsibilities, these rates were higher than Federal rates effective at that time, which had been in existence without change since 1923.

In the last two years, two increases have brought the Federal employees' schedule up to the following:

Here are the salaries ASCE now recommends as an interim measure, pending further study, to bring salaries more nearly in line with existing conditions:

ASCE REC. GRADES July 1944	ASCE REC. RATES July 1944	FEDERAL PROF. GRADES	FEDERAL RATES, EFF. July 1, 1946	ASCE REC. GRADES Oct. 1946	ASCE REC. RATES Oct. 1946
I	$1,980–2,460	...	....	...	....
II	2,460–3,000	P-1	$2,645–3,400	I	$2,700–3,400
III	3,000–3,600	P-2	3,400–4,150	II	3,400–4,200
IV	3,600–4,200	P-3	4,150–4,902	III	4,200–5,100
V	4,200–5,160	P-4	4,902–5,905	IV	5,100–6,100
VI	5,280–6,480	P-5	5,905–7,102	V	6,100–7,250
VII	6,720–7,920	P-6	7,102–8,180	VI	7,250–8,600
VIII	8,160–9,360	P-7	8,180–9,975	VII	8,600–10,350
IX	9,600 and up	P-8	9,975–10,000	VIII	10,350–12,600
	....	P-9	10,000 and up	IX	12,600 and up

Podium, Page, and Screen Vital Mediums of Professional Recognition, Says ECPD

Year's Accomplishments Reported at New York Meeting

TO BRING the work of engineers before the public, extensive use of public assemblies, the press, and movies should be made. This assertion was made at the October 18 meeting of the Engineers Council for Professional Development by Dean Nathan W. Dougherty, M. ASCE, of the University of Tennessee, reporting for the Committee on Professional Recognition.

Ways and means of attaining professional recognition were detailed in the report, in which a plea was made "to all engineers for greater participation in civil and political fields." He stated that in addition to activity in community gatherings, the power of the press must not be overlooked. "Excellent books," he stated, "have been written during the last few years on the work of the engineer. Unfortunately, the book-reading public is relatively small in number as compared with those who buy magazines. This field has been neglected by us in late years." To encourage the preparation of articles with popular appeal for such magazines as the *Saturday Evening Post* and *Readers' Digest*, Dean Dougherty suggested "an annual competition sponsored by ECPD, for the ten best papers popularizing the specific work of the author, of a type acceptable to the editors of the national magazines with large circulations."

"Another medium of popularizing is of course the screen," he continued. "Too often the lay public thinks only of the professional engineer as the builder of bridges and skyscrapers. Could we not write specifications for a series of ten-minute films illustrating phases of the making of everyday necessities, each concluding 'March of Time'-wise with 'The luxuries of yesterday have become the necessities of today and are provided by that service-rendering group, the engineers'?"

Recommendations of this committee were:

"More rapid action toward developing a uniform code of ethics.

"Uniform membership requirements and uniform nomenclature for grades of membership in the technical engineering societies.

"Producing a permanent and popular record of engineering achievements during the war.

"That technical societies through their publications emphasize the professional phases of engineering.

"That constituent bodies should use their influence to prevent further multiplication of engineering specialties."

Reporting for the Committee on Student Selection and Guidance, Carl J. Eckhardt, Jr., pointed out the widespread use of a screening test for pre-engineering students. Called the "Pre-Engineering Inventory," the purpose of this test is to "select engineering students with the expectation which accompanies the selection of materials with which engineers deal." During the 1945–1946 academic year, 32 institutions used the inventory for 12,300 students.

A second screening is proposed with the preparation of "Sophomore Achievement Examinations." These will "serve to reassure those students who should continue their engineering studies." Their usefulness to the colleges in sampling the needs of their students is quite evident. Proposed, but not yet prepared, are "Senior Examinations" to provide information for graduating students, their educators and prospective employers. Money for these tests has been made available by the Carnegie Foundation for the Advancement of Teaching and by the Carnegie Corporation of New York.

For the guidance of students aspiring to be engineers, a booklet, "Engineering as a Career," was developed by the late Dean Emeritus R. L. Sackett, M. ASCE, of Pennsylvania State College, and President Allan R. Cullimore, of Newark College of Engineering. To date over 20,000 copies have been distributed through colleges, high schools, professional societies, book stores, and commercial agencies.

Reexamination of the curricula of all accredited engineering schools at an early date was recommended by the Committee on Engineering Schools. A questionnaire was sent to all such institutions to determine their readiness for such reexamination. Most institutions have replied that, because of difficulties encountered in returning to "normal" after the unusual experience of the war years, they would prefer that such inspection be postponed until 1947–1948.

New inspections have not been made during the last year. These will be made promptly "where a delay might cause an injustice." The accrediting of technical institutes is well under way by a committee headed by Dean H. P. Hammond, M. ASCE, of Pennsylvania State College. The committee also recommended that a program of accrediting graduate curricula should be inaugurated.

On the factual side, D. B. Prentice, president of Rose Polytechnic Institute, the chairman of the committee, reported that out of 167 degree-granting institutions in the United States, 133 now have one or more curricula accredited by ECPD. Of these, 108 have fully accredited curricula in civil engineering.

PROFESSIONAL TRAINING AIDS PROVIDED

To assist the engineer in his professional development after graduation, the Committee on Professional Training has prepared and circulated a number of aids. In his report, Dr. C. A. Pohl, M. ASCE, New York consulting engineer, listed the following: reading lists and bibliographies, personal appraisal blanks, lists of college extension programs, lists of appropriate articles, and reprints of certain pertinent articles. Dr. Pohl's committee

It's Not Too Early—

to make your plans for the Annual Meeting of ASCE, to be held in New York, N.Y., January 15–18, 1947. The Hotel Commodore is to be the meeting headquarters. Write for reservations now. Those desiring to stay at the Engineers' Club, 32 West 40th Street, New York 18, N.Y., should likewise make reservations promptly. In fact, no matter what hotel is chosen, reservation should be made just as soon as possible. It cannot be stressed too strongly that hotel space in New York is at a premium.

The meeting promises to be an enthusiastic one, marked by many features of interest. On Wednesday morning prizes will be presented, Honorary Memberships conferred, and new officers introduced. Later sessions will be marked by the presentation of many technical papers now in process of preparation. There will be trips to points of engineering and general interest and special entertainment features for the ladies, who of course will not be overlooked by the program committee. The dinner dance will take place on Wednesday evening, and the Smoker on Thursday evening.

urged closer cooperation between practicing engineers and the younger members of the profession, to the end that encouragement and direction be given to the professional development of those entering the engineering profession.

The Committee on Employment Conditions for Engineers reported that during the year its chairman, V. T. Boughton, M. ASCE, associate editor, *Engineering News-Record,* had studied the activities of the Engineers' Joint Council Committee on the Economic Status of the Engineer, which is actively surveying the compensation of the whole engineering profession. In view of the progress being made by EJC and the doubtful value of duplicating the effort, Mr. Boughton's committee recommended that this group be discharged and that ECPD request permission to continue to have an observer sit in at meetings of the EJC committee.

The Committee on Principles of Engineering Ethics, under the chairmanship of D. C. Jackson, M. ASCE, Professor Emeritus of Electrical Engineering at Massachusetts Institute of Technology, reported the development of a universal "Canon of Ethics" for all engineers. The code has been prepared after extensive study of the respective codes of the participating societies and the draft has been approved by the majority of constituent organizations. The final code is expected to be issued soon.

ENGINEERING SOCIETIES LISTED

The preparation of a list of all engineering societies in America (including Canada) was an accomplishment reported by the Committee on Information. Sydney Wilmot, Manager of Technical Publications for the American Society of Civil Engineers, chairman of the committee, reported that 237 organizations had been listed, with classification according to "grade of membership subject to admission requirements." This committee also reported the pending publication of the Fifteenth Anniversary Booklet of ECPD.

This booklet has been prepared for dual purposes—information on the activities of ECPD and the stimulation of contributions to a research fund to be administered by the Ways and Means Committee. This research program will be under the direction of a special subcommittee headed by R. L. Goetzenberger, vice-president of Minneapolis Honeywell Regulator Company. This subcommittee reported that "fund raising is our primary objective . . . to defray the expense of any cooperative research project supervised by Engineers' Council for Professional Development." To give meaning to the fund-raising campaign, the committee called for "a listing of projects which require investigations within its scope to perform, and for the accomplishment of which funds are necessary."

Tellers Canvass Second Ballot for 1947 Nominees to Society Offices

October 15, 1946

To the Secretary of the
American Society of Civil Engineers

The tellers appointed to canvass the Second Ballot for Official Nominees report as follows:

For Vice-President, Zone II

Gail A. Hathaway	963
Gustav J. Requardt	808
Void	4
Total	1,775

For Vice-President, Zone III

Ralph B. Wiley	1,243
Ivan C. Crawford	674
Void	1
Total	1,918

For Director, District 3

Harland C. Woods	189
Louis Mitchell	121
Void	1
Total	311

For Director, District 5

Roy W. Crum	293
Wm. H. Richards	123
Void	0
Total	416

For Director, District 7

Lewis M. Gram	376
Void	0
Total	376

For Director, District 8

S. A. Greeley	235
C. M. Hathaway	162
Void	0
Total	397

For Director, District 9

Daniel V. Terrel	385
Void	0
Total	385

For Director, District 12

Walden Le Roy Malony	245
Void	1
Total	246

For Director, District 16

D. L. Erickson		247
George S. Knapp		228
Void		0
Total		475
Ballots canvassed		6,299
Ballots withheld from canvass:		
From members in arrears of dues	71	
Without signature	26	
With illegible signature	0	
Total withheld	97	97
Total number of ballots received		6,396

Respectfully submitted,

George T. Gilman, *Acting Chairman*

W. H. Dieck
H. F. Hormann
R. E. Kuhn
F. V. Hayes
E. H. Harder
M. E. Fiore
J. D. Parsons
A. Di Giacinto
A. Cortland
H. H. Cashdan
N. D. Richardson
H. Holbrook

Tellers

Kinzel Again Heads Engineering Foundation

At its annual meeting on October 17, the Engineering Foundation reelected Dr. A. B. Kinzel, internationally known metallurgist, as chairman for the coming year. Other officers elected were Dr. L. W. Chubb, director of the Westinghouse Research Laboratories, as vice-chairman; Dr. John H. Colpitts, reelected director; and John H. R. Arms, reelected secretary.

During the past year, the Foundation has participated in eleven research projects. These projects involved such diversified fields as soil mechanics, hydraulics, alloys of iron, metal cutting, lubrication, rolling friction, welding, and plastic flow of metals. The Research Procedure Committee this year will be headed by Dr. Chubb, recent recipient of the John Fritz Medal.

The Engineering Foundation was established in 1913 for "The furtherance of research in science and engineering and for the advancement in any other manner of the profession of engineering and the good of mankind."

Additions to Headquarters Staff and Reassignment of Duties Are Announced

GEORGE S. SALTER

DONALD D. KING

DON P. REYNOLDS

Two additions to the Society's staff and reassignment of duties of two other staff members are announced by Col. William N. Carey, Executive Secretary of ASCE.

To increase the services of the Society, George S. Salter, M. ASCE, former secretary and now vice-president of the Illinois Section of the Society, has been appointed Mid-West Field Secretary, with offices in Chicago at 228 North La Salle Street. Mr. Salter, for the past two years, has served with the Engineering Board of Review, City of Chicago, as engineer-secretary, 1944–1945, and projects engineer, 1946. His previous work includes assignments with the Department of Subways and Superhighways, City of Chicago; with the Chicago World's Fair in structural design of utilities; with the Sanitary District of Chicago; and with the International Petroleum Company, Tampico, Mex.

Donald D. King, Assoc. M. ASCE, has been added to the staff at National Headquarters and assigned to the editorship of CIVIL ENGINEERING. He was a member of the original CIVIL ENGINEERING staff when the publication was initiated in 1930 and served 13 years as assistant editor in charge of art and production. From 1943 to 1945 Mr. King was with the Office of the Air Engineer, AAF, as editor of the Army publication *Aviation Engineer Notes,* and from 1945 to 1946 with McGraw-Hill's *Construction Methods* as assistant editor and more recently as head of his own advertising business.

Allen J. Wagner, Affiliate ASCE, who temporarily assumed the duties of editor of CIVIL ENGINEERING for the past three months, in addition to his duties as public relations assistant to the Secretary, is made executive editor, in which capacity he will assist Capt. Carl E. Beam, M. ASCE, manager, in the direction of the publication. He will continue to perform his other public relations duties.

Don P. Reynolds, Assoc. M. ASCE, who has been with CIVIL ENGINEERING for the past four years, first as assistant and later as associate editor, has been made assistant to the Secretary. In the new post his principal duty will be to transact business dealing with Local Sections and Student Chapters. Prior to his association with the Society, Mr. Reynolds was engaged as an engineer in a consulting office in Toledo, Ohio; had engineering service with the Sun Oil Company in Toledo, and with the City of Toledo on construction of its Lake Erie water supply system.

Make January Meeting Reservations at Once

BECAUSE the United Nations Assembly will be holding its sessions in New York at the time of the Society's Annual Meeting, hotel rooms will be more difficult to obtain than at any time during or since the war.

Therefore reservations for rooms must be made now if you plan to attend the January meeting.

1946 Prizes and Awards Announced

THE Board of Direction, at its Kansas City Meeting, approved the following prizes and awards, which will be distributed at appropriate ceremonies at the Annual Meeting in New York in January. Further details, together with biographical material concerning the recipients, will appear in an early issue of CIVIL ENGINEERING.

Norman Medal

KARL TERZAGHI, M. ASCE, for Paper 2253, "Stability and Stiffness of Cellular Cofferdams."

J. James R. Croes Medal

GAIL A. HATHAWAY, M. ASCE, for Paper 2247B, "Military Airfields—Design of Drainage Facilities."

Thomas Fitch Rowland Prize

JAMES B. HAYS, M. ASCE, for Paper 2250A, "Unusual Cutoff Problems—Deep Solution Channel, Kentucky Dam, Kentucky."

James Laurie Prize

L. A. SCHMIDT, JR., M. ASCE, for Paper 2250B, "Unusual Cutoff Problems—Flowing Water in Underground Channels, Hales Bar Dam, Tennessee."

Wellington Prize

JAMES H. STRATTON, M. ASCE, for Paper 2247A, "Military Airfields—Construction and Design Problems."

Collingwood Prize for Juniors

C. O. CLARK, Jun. ASCE, for Paper 2261, "Storage and the Unit Hydrograph."

The John C. Stevens Award

JOHN S. MCNOWN, Jun. ASCE, for his discussion of Paper 2259, "Lock Manifold Experiments." This award is given for the most meritorious discussion in the field of hydraulics, published in vol. 110 of TRANSACTIONS.

Construction Engineering Prize

GEORGE K. LEONARD, M. ASCE, for

his paper "Lining the Eight-Mile Apalachia Tunnel," which appeared in the September 1945 issue of CIVIL ENGINEERING. This prize, given annually on advice of the Construction Division, is the only prize specifically limited to material appearing in CIVIL ENGINEERING. It was established in 1939 by A. P. Greensfelder, M. ASCE.

Hoover Medal Board of Award

DR. VANNEVAR BUSH, President, Carnegie Institute, Washington, D.C., the Hoover Medal for 1946.

Directors Discuss Dues Raise to Meet Increased Costs of Society Activities

THE SOCIETY, like the railroads, industry, and in fact every individual, is feeling the rough impact of the ever-rising spiral of increased costs. Its preliminary budget for 1947 showed estimated expenses for the year at about $55,000 over estimated income. This raised the question of increasing membership dues.

An increase in dues would require an amendment to the ASCE constitution, and at its Fall Meeting in Kansas City the Board of Direction gave serious consideration to the problem of increasing income as against drastic reduction in activities.

During the discussions, it was pointed out that the amount of present annual dues was established by a constitutional change in 1921. Since that date, few Society activities have been curtailed and many have been added, principally toward giving more direct Society benefits to the members.

Cost of producing Society publications has skyrocketed in recent years. Costs of operations of committees have increased materially, as have the low-bracket salaries of Society employees. All materials and supplies cost more today than in the past.

Faced with this difficult situation, the Board of Direction decided to recommend to the membership that dues be raised. The recommendation is that the annual dues of all Corporate Members and Affiliates be raised in the amount of $5, and those of Juniors, $2.50.

In reaching the decision to recommend the increase in dues, there was discussion of the possibility that increased income so obtained might obviate the present necessity of charging for paper-bound volumes of TRANSACTIONS.

Discussion in the Board meeting indicated that no means appeared available whereby 1921 dues dollars could be stretched to cover 1947 expenses, now that Society activities again are in full postwar swing. Emphasis was placed on the fact that this is a problem for full discussion and consideration in the Local Sections. Directors will take the problem back to their districts for full discussion in the Local Sections.

Society Groups May Borrow Navy Films

SPLENDID cooperation on the part of the Navy's Bureau of Yards and Docks has made it possible to show movies prepared by the Bureau at meetings of the Society's Local Sections and Student Chapters. A wide variety of subjects of special interest to civil engineering groups has been selected for such distribution. Included are documentary films of Seabee accomplishments, descriptive accounts of base construction, and such "how-to-do-it" subjects as the step-by-step construction of a pre-stressed concrete tank.

These films, all sound, some in color and some in black and white, were shot on the job (sometimes under combat conditions) by Navy photographers. Excellent film editing produced a series of well-planned, instructive as well as impressive, movies. They have been used as training aids in the services and to some extent for purposes of public relations.

In arranging to show any of the films, local groups should correspond directly with Society Headquarters at 33 W. 39th Street, New York 18, N.Y. The films, selected from the following list, should be reserved well in advance of the scheduled date of showing. All are 16-mm and can be shown only on a sound projector.

Film No. 5,000—Seabees, the Navy's Fighting Construction Men the World Over. This film, running 47 minutes, is a documentary one showing the general accomplishments of the Navy's Construction Battalions. Each type of operation is covered in brief shots.

Film No. 5,001—Seabees in Normandy. The contribution of the Construction Battalions in landing on Normandy's beaches is shown by this film, running 24 minutes.

Film No. 5,002—Seabee Report from the European Theater. In the 30 minutes this film runs, landing operations and base construction in Tunisia, Salerno, and Normandy are shown. Repair bases, construction and use of pontoon causeways, are among the subjects covered.

Film No. 5,003—Earth Movers. Uses of all types of earth-moving equipment are shown in the 20-minute length of this film. Many types of problems are encountered and helpful suggestions made for unusual uses of standard earth-moving equipment.

Film No. 5,009—Construction of Prestressed Concrete Tanks. This is a "how-to-do-it" film running 30 minutes. From the surveys locating a construction site to the final grading around the finished tank, this film completely covers each step in the construction of a pre-stressed reinforced-concrete storage tank. The procedure, not exclusively military, is highly instructive to civilian constructors.

Film No. 5,010—Graving Drydock Construction by Tremie Method. Step by step, for 30 minutes, the tremie concreting of a graving dock is portrayed. Various types of docks, soils, and gates, as well as pile driving and other related work, are covered.

Film Nos. 5,026, 5,026A—Floating Drydocks for Fleet Repairs. In two reels, totaling 60 minutes of running time, the complete story of construction and use of floating drydocks is told by sound film.

Electrical Engineer Wins John Fritz Medal

THIS YEAR the John Fritz Medal, sometimes called the highest award of the engineering profession, goes to Dr. Lewis Warrington Chubb, member and former director of the American Institute of Electrical Engineers. Dr. Chubb, who is director of the Westinghouse Research Laboratories, will receive the award at the winter convention of the institute, to be held in New York, January 27–31.

Born in Fort Yates, N.Dak., in 1882, Dr. Chubb graduated from Ohio State University in 1905. He is known for his work on the magnetic properties of iron and iron alloys, and his improvements in the design of electrical machinery and the measurement of electrical and magnetic quantities. The breadth of his work is attested by the fact that he holds almost 200 patents in the electrical, mechanical, chemical, and welding fields. The present award goes to him "for pioneering genius and notable achievements during a long career devoted to the scientific advancement of the production and utilization of electrical energy."

The John Fritz Medal, established in 1902 by the Four founder Societies for notable scientific or industrial achievement, is international in scope, having gone to Lord Kelvin and Marconi as well as to such Americans as Thomas A. Edison, George W. Goethals, and Orville Wright. The Board of Award consists of four past-presidents of each of the Four Founder Societies.

Appointments of Society Representatives

Harland Bartholomew, M. ASCE, of St. Louis, Mo., and John Nolen, Jr., Assoc. M. ASCE, of Washington, D.C., have been appointed as ASCE representatives for the organization meeting of the National Conference on Urban Planning.

Ernest E. Howard, M. ASCE, has been appointed to represent the Society at future hearings on the Bloom Bill (H.R. 4982), with Irving A. Huie and R. J. Tipton serving as alternates. These three officers constitute the Society's National Affairs Committee.

News of Local Sections

Scheduled Meetings

Arizona Section—Annual fall meeting at the Hotel Adams, Phoenix, November 30, at 9:30 a.m.

Connecticut Section—Dinner meeting in New Haven, Conn., November 20, at 6:30 p.m. Program to be arranged by the Juniors.

Florida Section—Dinner meeting at the Seminole Hotel, Jacksonville, November 7, at 7 p.m.

Iowa Section—Meeting at the Hotel Fort Des Moines, Des Moines, November 21, at 3 and 6:30 p.m. W. W. Horner, President ASCE, will speak.

Louisiana Section—Meeting at the St. Charles Hotel, New Orleans, November 25, at 8 p.m.

Metropolitan Section—Technical meeting in the Engineering Societies Building, New York, November 20, at 8 p.m. Meeting of the Junior Branch in the Engineering Societies Building, November 13, at 7:30 p.m.

Miami Section—Dinner meeting at the Downtown Club (in Seybold Arcade), Miami, November 7, at 7 p.m.

Northeastern Section—Dinner meeting at the Engineers Club, Boston, November 25, at 6 p.m.

Northwestern Section—Dinner meeting at the Campus Club, University of Minnesota, November 4, at 6:30 p.m.

Philadelphia Section—Technical meeting at the Engineers' Club, Philadelphia, November 12, at 7:30 p.m.; dinner at 6 p.m.

St. Louis Section—Technical meeting at the Engineers Club, St. Louis, December 5, at 8:15 p.m.

Syracuse Section—Meeting at the Syracuse Museum of Fine Arts, November 11, at 8 p.m. Joint dinner with the Technology Club of Syracuse at 6:30 p.m.

Tennessee Valley Section—Fall meeting at the Hotel Patten, Chattanooga, November 8 and 9. Registration at 9:30 a.m., November 8.

Texas Section—Fall meeting at the Hamilton Hotel, Laredo, Tex., November 21 and 22, and at Monterrey, Mexico, November 23 (Pullmans will leave Laredo for Monterrey during the evening of November 22). Luncheon meeting of the Dallas Branch at the Adolphus Hotel, December 2, at 12:15 p.m.; luncheon meeting of the Fort Worth Branch at the Blackstone Hotel, November 4, at 12:15 p.m.

Toledo Section—Dinner meeting at the Elks, Club, Toledo, November 6, at 6:30 p.m.

Wisconsin Section—Dinner meeting in the American Legion Building, Madison, November 13, at 6:30 p.m.; technical meeting begins at 7:30 p.m.

Recent Activities

CENTRAL OHIO SECTION

Elimination of stream pollution was discussed by F. H. Waring at the September meeting of the Section. Mr. Waring, who is chief engineer for the Ohio State Department of Health, cited early attempts to protect the water supply of the city of Cincinnati and the gradual cooperation of the states lying on the Ohio River and its tributaries. Now after forty years, he pointed out, the pollution problem everywhere is intensified by the greater density of the population and the growth of industry. Fortunately, however, the knowledge of the profession and the education of the general public have increased to a point where clean streams are a possibility. Mr. Waring concluded his talk by showing a colored sound motion picture, "Clean Waters."

CINCINNATI SECTION

At the October dinner meeting K. B. Woods, professor of civil engineering at Purdue University, gave a Kodachrome-illustrated travel talk on "The Physiognomy of the United States." The "trip" on which Professor Woods took the members covered the northwestern and west central parts of the country as well as the lower Mississippi Valley. Professor Woods discussed particularly the physiographic features of the land and their relationship to engineering structures, especially highways.

COLORADO SECTION

Several business matters were discussed at the regular September dinner meeting. Then Lt. Col. T. Blench, speaker and guest of honor, was introduced. Colonel Blench, who is in the irrigation branch of the Department of Public Works of India at Punjab, explained the problems involved in trying to build dams on the sediment-laden rivers of India, and pointed out the economic necessity for allowing colloidal material to pass through diversion works. He concluded that the present irrigation problem in India will provide only temporary prosperity unless it is accompanied by sediment control by means of soil conservation, control of the elevation of the ground-water table, and maintenance of the colloidal content in the water for purposes of fertilization.

CONNECTICUT SECTION

A talk on "Future Developments in Aviation" constituted the technical program at the September dinner meeting, which was held in Hartford. This was given by Charles J. McCarthy, vice-president of United Aircraft Corporation, who illustrated his talk with lantern slides. Differences between gas turbines, turbo-jet, and turbo-propeller propulsion and the advantages and disadvantages of each were explained. The group was also much interested in a discussion of the difficulties that occur in high-speed flight when the speed of the plane approaches the speed of sound waves.

DAYTON SECTION

George Wallace, executive director of the Montgomery County Plan Board, addressed a recent noon gathering on the aims and activities of the Board. The Board was established about a year ago to augment the Planning Commission of the City of Dayton. One of the first things the Board found necessary, Mr. Wallace stated, was the preparation of road, subdivision, and topographic maps of the entire county, and the establishment of a thoroughfare plan for the county. The next step was to establish platting rules and regulations for the areas not covered by the Dayton Planning Commission. Mr. Wallace pointed out that the vital need for such an organization is apparent, when it is realized that the metropolitan area of Dayton will require 30,000 new homes in the next five years.

DULUTH SECTION

A special dinner meeting was held in September to discuss the advisability of entertaining the 1947 Society Convention in Duluth. Guests included Society Director R. W. Gamble, of Milwaukee, and Frank S. Altman, secretary of the Northwestern Section. Both offered information as to what would be expected of the Section in preparing for the Convention. After a thorough canvass of the situation, it was decided to invite the Society to come for a Convention. The after-dinner entertainment consisted of the showing of Kodachrome films of the scenery of the Arrowhead country and of Hawaii. The usual luncheon meeting, held later in the month, was devoted entirely to business discussion.

FLORIDA SECTION

A large delegation of students and faculty from the University of Florida made the trip from Gainesville to Jacksonville for the Section's October dinner meeting. The speaker of the evening was S. S. Schullman, chief engineer of Prima Products, Inc., New York City. Discussing Aquella, one of his company's products, Mr. Schullman stated that it can be used only on porous masonry and gave specific instructions for its application. When properly applied, he said, it becomes a part of the structure itself. It has been found that where buildings and homes have been treated with Aquella, it actually reduces the heat within the structure. It has also been found that the sun's rays have no detrimental effect on walls or surfaces treated with the substance. Aquella was successfully used in the tunnels on the Pennsylvania Turnpike, Mr. Schullman brought out. However, he emphasized that it cannot be recommended to eliminate condensation, or where acid conditions prevail or where there is a constant flow of running water. Wide interest in his subject was attested by an enthusiastic general discussion.

GEORGIA SECTION

Entertainment at the September luncheon meeting consisted of a talk by Melvin R. Williams, associate hydraulic engineer for the U.S. Geological Survey, who described high lights of a trip to Japan. During the business session H. Harvie Perkins announced that he was forced to resign as president of the Section, because he is leaving Georgia and his post with the Civil Aeronautics Administration to go into business for himself at Bristol, Tenn. The October meeting was devoted to a discussion of Engineers Joint Council, which was led by Paul Weir, chairman of the Section's Committee on EJC.

ILLINOIS SECTION

The role of engineering in the Pacific theater of war was graphically described by Leif J. Sverdrup, St. Louis consultant, at the October dinner meeting of the Illinois Section. Mr. Sverdrup, who served in the Pacific area of war for three and a half years, with the rank of major general, described the construction of an airport runway on the island of New Guinea, using only native unskilled labor and picks and shovels. Some of the natives, Mr. Sverdrup stated, had never seen an outsider until the war took white men to the remote islands of the Pacific. However, he said, construction of the runway demonstrated that satisfactory results can sometimes be obtained by the most antiquated means.

INDIANA SECTION

The first fall meeting of the Section took place in Indianapolis at the end of September. First on the program, B. B. Lewis, associate professor of railroad engineering at Purdue University, spoke on "Railroad Problems in Central America." Professor Lewis, who was formerly chief engineer and general manager of the International Railways of Central America, pointed out that lack of unification of the railroad systems of the country has complicated operation to a considerable extent. Further difficulties in maintenance and operation are caused by the steep grades, slides, earthquakes, and washouts. A discussion on Engineers Joint Council concluded the program. This was led by O. S. Finch, vice-president of the Section. Society Director Frank C. Tolles, who was a guest of the Section, urged Section support of EJC and outlined recent projects of the Board of Direction for making the Society of greater benefit to the individual members.

KANSAS CITY SECTION

A picnic and outing at the farm of J. C. Long, president of the Section, pleasantly initiated the fall activities of the Section. After an afternoon of sports and a picnic dinner, the group gathered around a camp fire to hear R. N. Bergendoff, general chairman of the Kansas City Meeting committee, speak on plans, activities, and work in connection with the Fall Meeting. Later in the month there was an evening meeting, which was addressed by Maj. Gen. L. R. Groves. General Groves described his experiences in connection with the development of the atomic bomb, pointing out that, under war duress, it was necessary to conduct several different approaches to the problem, with the result that the preliminary research and development was necessarily costly. Interesting details and amusing experiences during the early stages of the development were related. For some time, for instance, after the plant was actually in operation, the elements that were fed into it completely disappeared in the process, General Groves stated, and it took considerable effort on the part of a number of scientists to finally detect their whereabouts.

METROPOLITAN SECTION

"Democracy will perish if intelligent bargaining cannot be had on each side of a conference table," George A. Brenner told the Metropolitan Section at its first fall meeting, which was held in New York on October 16. Mr. Brenner—member of the New York law firm of Butler and McVeigh, which represents a number of the leading New York labor unions—emphasized the advisability of cooperation instead of conflict in labor relations. "If we as people shirk our responsibilities, we shall have in this country an absolutism, which varies little from other forms of absolutism in other parts of the world," he pointed out. "No rights would be left for either management or labor."

The inside story of the formation of Engineers Joint Council and its activities was told to the Junior Branch at its opening session in October by Malcolm Pirnie, Past-President of the Society. The Council has proved effective as a meeting ground for engineers from various branches, said Mr. Pirnie, who cited as examples of joint activities the reports on the industrial disarmament of Germany and Japan. A discussion of the Junior's status in the Society was led by Edward E. Lustbader, a member of the Society's Committee on Juniors.

MOHAWK-HUDSON SECTION

Meeting at Rensselaer Polytechnic Institute at Troy, N.Y., early in October, members of the Section heard Joseph Lamprecht speak on the "Restoration of Concrete in Hydraulic Structures." Mr. Lamprecht, an alumnus of Rensselaer Polytechnic Institute, was for many years associated with the Utica Gas and Electric Company and is at present engaged in private practice in Syracuse, N.Y. He illustrated his talk with lantern slides showing the various methods of restoring concrete.

NORTHWESTERN SECTION

Part of the October 7 dinner meeting of the Northwestern Section was devoted to business discussion. The group then heard Lt. Col. Delbert Freeman, district engineer for the U.S. Engineer Office at Omaha, Nebr., speak on the Missouri River Development Program. Colonel Freeman described the progress made to date, the materials involved, and the results that may be expected in the next ten or fifteen years, as funds are available for the program. A general discussion concluded the evening.

OKLAHOMA SECTION

The Oklahoma Section had an afternoon meeting late in September. Following a business session, Dennis E. Donovan, architect and engineer, presented a paper, entitled "Ultimate Stresses in Reinforced Concrete Beams." Mr. Donovan's paper aroused considerable discussion from the floor. The showing of a film on lighter-than-air hangar construction completed the program, after which there was a group dinner.

SACRAMENTO SECTION

RAILROAD OPERATIONS constituted the theme of three of the four luncheon meetings, held in September. At the first meeting, H. M. Link described his wartime railroad experiences during a two-year stay in Iran, and later in the month S. L. Boque spoke on the problems of a storekeeper for the Southern Pacific Railroad. At a third luncheon, G. F. McCormack presented colored slides and a narrative of the operation of the Southern Pacific over the Sierra Nevadas. On Junior Day, four Juniors of the Section—James Doody, Richard Bennion, Gordon Klippel, and Jack Barrish—presented a symposium on the contribution of Juniors to the war effort, each describing some event in his own particular war experience.

ST. LOUIS SECTION

THE ORGANIZATION OF Engineers Joint Council, its past accomplishments and future aims, was explained by Society Director Harry F. Thomson at a recent luncheon meeting. A report of Section studies of EJC activities was then presented by A. F. Griffith, chairman of the Section Committee on EJC. In behalf of the committee, he also introduced a resolution endorsing the work of EJC and pledging the support of the St. Louis Section in its activities. The resolution was unanimously adopted. Among the guests were Col. R. E. Smyser, Jr., the new district engineer at St. Louis, and Col. L. B. Feagin, former district engineer. Both were introduced to the group.

TENNESSEE VALLEY SECTION

AT AN UNUSUALLY large dinner and smoker, held by the Chattanooga Sub-Section in September, W. F. Moehlman, president of the Tennessee Valley Section, who was among the guests, spoke briefly expressing his satisfaction with the use that has been made of Section funds in stimulating member interest, as evidenced by the good attendance. The feature of the occasion was an illustrated lecture on the methods used to decrease leakage at the Great Falls project. This was given by A. H. Weber, of the TVA staff. Pictures taken before and after grouting showed the effectiveness of the grout in sealing the seams of the rock in the reservoir rim.

At a recent meeting the Knoxville Sub-Section was presented with a handsome lectern by Fred C. Schlemmer, the presentation being made by Ross Riegel in Mr. Schlemmer's absence. Mr. Riegel explained that Mr. Schlemmer recognized the need for the lectern when he gave his recent talk on India to the Knoxville group. The speaker of the evening, Oren Reed, then christened the lectern with a talk on Brazil.

TEXAS SECTION

NUMEROUS BUSINESS MATTERS were discussed at the September meeting of the Fort Worth Branch, and arrangements were made for a delegation to attend the fall meeting of the Texas Section, which will be held at Laredo, Tex., and Monterrey, Mexico. A talk on the "Workings of the Scientific Mind"—given by Dr. John Potts—comprised the technical program.

TOLEDO SECTION

NEW HEAVY INDUSTRIES may soon be attracted to Toledo by assurance of a more certain supply of cheap underground water, C. V. Youngquist told members of the Section at their first fall meeting. Mr. Youngquist, who is chief engineer for the Ohio Water Resources Board, at Columbus, told of the great amount of work being done to map the underground and surface supplies of water in the state. In Toledo to confer with Samuel C. McKee, Lucas County sanitary engineer, Mr. Youngquist disclosed findings of a county survey, which traces the underground path of a buried stream of water extending in limestone through Lucas County and under the bed of Lake Erie. In width, the stream is approximately the same as the Maumee River, Mr. Youngquist said. However, before complete information can be made available to industry, test drilling and pumping tests will be required.

TRI-CITY SECTION

A MEETING OF the Section was held at Davenport, Iowa, late in September for the purpose of acquainting the membership with the activities and functioning of Engineers Joint Council. The principal talk on this subject was given by Herman S. Smith, president of the Section, who pointed out that the Quad-City Technical Council, of which the Tri-City Section is one of five affiliating groups, is organized along the approved pattern established by EJC.

WEST VIRGINIA SECTION

THE FALL MEETING of the West Virginia Section took place in Huntington late in September. Appearing on the afternoon technical program were James D. Francis, president of the Island Creek Coal Company, who spoke on the subject, "Engineering in the Coal Industry"; Robert R. Philippe, chief of the Ohio River Division Laboratories of the Corps of Engineers at Cincinnati, who described experimental work in progress at the laboratory; and Society Director William R. Glidden, of Richmond, who discussed various matters of interest to the Society, emphasizing particularly the importance of EJC work. During the business session the following officers were elected for 1947: E. M. Brown, president; J. N. Wallace, vice-president; and Kenath Kettle, secretary-treasurer. John B. Hoke remains as a vice-president for another year. The dinner meeting, held in the evening, was addressed by James F. Fairman, vice-president of the Consolidated Edison Company of New York, and also vice-president of the National Society of Professional Engineers. Speaking on "The Place of the Engineer in the Modern World," Mr. Fairman stressed the need of an organization that will present a solid front in advancing the engineering profession.

WISCONSIN SECTION

THE HOUSING PROBLEM as it affects large cities in general, and the city of Milwaukee in particular, was outlined by Rudolph J. Nedved at the September dinner meeting. Mr. Nedved, who is housing consultant for the Milwaukee County Board, stated that Milwaukee will need approximately 7,500 new houses per year for the next ten years. In the clearance of blighted areas, he said, many problems must be overcome, such as the prevailing grid pattern of street layout, changes in streets and utilities, relocating displaced residents, ethnic group problems, and political pressures.

Student Chapter Notes

AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS

THE STUDENT CHAPTER at the Agricultural and Mechanical College of Texas reports the largest enrollment in the history of the college. At the present time there are approximately 175 active members in the organization, of whom 65% are veterans who have returned to college under the G.I. Bill of Rights. The fall activities of the Chapter include a recent banquet, which was addressed by J. T. L. McNew, Society Vice-President and vice-president of the Texas A. and M. College. He spoke on the question of unionization for engineers. Mr. McNew, a former head of the civil engineering department, has always taken an active interest in the Student Chapter. The Chapter sent twelve delegates to the Kansas City Meeting of the Society.

About Engineers and Engineering

Engineers and others wishing to order the bulletin should get in touch with the Airport Division of the American Road Builders Association, International Building, Washington 4, D.C. Single copies will be free to members of the Association, but if a number of copies are desired the cost will be 50 cents a copy.

American Engineering Groups Described at Paris Congress

"THE ENGINEER in the United States of America is a vital factor in the life of his nation," said Col. C. E. Davies, Secretary of ASME, in addressing the International Technical Congress in Paris. "He changes its economy and modifies the customs and social habits of its people. He is an idealist and a dreamer. He is a realist and a doer. He cooperates with his colleagues in technology but is impatient with politics. He is frequently charged with lack of understanding of the social effects of his work . . . but his work is good and he does have a high sense of professional responsibility."

Colonel Davies gave statistics on American engineers, and showed how they arrange their professional life. He described and listed the professional engineering societies in the United States, giving particular attention to recent activities of the Engineers Joint Council. The Council is now engaged, he said, in "a comprehensive study of the needs of engineers for a national form of organization that will more properly serve the engineering profession in discharging its professional responsibilities."

The Engineering Joint Council, Mr. Davies explained, is pushing a program of international cooperation, collecting engineering literature for war-devastated libraries, and cooperating with the United Nations Educational Scientific and Cultural Organization. Nationally it aids in legislation, and is now making a survey and report of earnings of engineers with relation to education, years in practice, and field of specialization. This Economic Status Survey includes a survey of industry to determine company policies regarding selection, training, advancement, guidance and professional activities of graduate engineer employees. It also includes a survey on the problem of collective bargaining as it affects engineers in the United States.

The Paris International Technical Congress, composed of delegates from most of the United Nations, was held at the Maison de la Chimie, September 16 to 21. The ASCE official representative at the Congress was Prof. Frederick B. Farquharson of the University of Washington's Civil Engineering Department. Although he did not travel to Paris, Col. William N. Carey, Executive Secretary, ASCE, served as the ASCE representative on the U.S. committee on arrangements for the Congress.

ESNE Comprises 17 Engineering Societies

AN ADDRESS delivered by Albert Haertlein, ASCE Director and President of the Engineering Societies of New England, at the fall meeting of the American Society of Mechanical Engineers, reviewed the history of the organization which he heads.

Mr. Haertlein stated that in the 24 years that have passed since the Commonwealth of Massachusetts granted a charter to a group of nine engineering societies in the Boston area for the advancement of scientific investigation, education and research, 17 societies have affiliated themselves. Known first as the Affiliated Technical Societies of Boston, the name has been changed twice—first to the Engineering Societies of Boston and later to the present name of the Engineering Societies of New England. The present organization has a membership of 6,000.

The governing body of the corporation, consisting of two representatives from each affiliated society, is called the Council of the Engineering Societies of New England. Headquarters are maintained at 88 Tremont Street, Boston, where a full-time secretary is employed. The library of the Boston Society of Civil Engineers, located in the headquarters rooms, is also accessible to members of the other affiliated societies.

The organization publishes a weekly journal, which gives full notices of all meetings scheduled for the coming week as well as brief notices of meetings two or three weeks in advance. The journal also includes a brief editorial of general interest.

The first objective in the ESNE charter is to bring the technical societies in New England and their members into closer touch with one another for more effective public service. This is achieved by committees and by cooperation and participation with other local groups. Since technical meetings are one of the primary functions of each of the engineering societies, the ESNE does not compete with its affiliates by sponsoring such meetings. Ordinarily the annual meeting, at which a topic of interest to all engineers is presented, is the only one sponsored by the ESNE.

Soil Tests in Military Construction Described

A REPORT on "Soil Tests for Military Construction"—presented by Maj. George E. Bertram at the forty-third annual meeting of the American Road Builders Association—has been issued as Technical Bulletin No. 107 of that organization. Although Major Bertram deals primarily with the equipment for soil testing and expedient tests used in military construction, the bulletin also constitutes a valuable contribution to peacetime construction.

The 95-page manual is divided into five main sections: (1) field identification of soils, (2) equipment, (3) laboratory setups, (4) soil exploration and sampling, and (5) test procedures. Each of the sections is well illustrated by line drawings, photographs, and charts, and the appendix lists the equipment required in soil testing.

Seabee War Museum Is Being Established

WARTIME RECORDS, trophies, and other mementos of the Seabees and the Navy Civil Engineer Corps will soon be housed in a museum being established for the purpose. The museum will be located at the Navy Construction Battalion Center, Port Hueneme, Calif.

The Navy's Ordnance Museum—now at Bellevue, D.C., under supervision of the Naval Ordnance Laboratory—will eventually be moved to the new research center at White Oak, Md. It contains all types of American and foreign ordnance materials, ranging from fuses and flares to mines and V-weapons.

Princeton University Has Bicentennial Conference

THE BROAD FIELD of "Engineering and Human Affairs" was the theme of the Princeton Bicentennial Conference, held at Princeton University, October 2–4. Under this general head, the technical sessions dealt with "Engineering and the Material Aspects of Society"; "Technology, Engineering and the Individual"; and "The Future Development of Engineering."

Distinguished engineers from all over the country and from several foreign lands were guests of the university for the occasion, including several ASCE members. Among the latter were Thomas H. MacDonald, Honorary Member and commissioner of the Public Roads Administration; Ernest E. Howard, Society Vice-President and consulting engineer of Kansas City, Mo.; and H. P. Hammond, dean of the engineering school at Pennsylvania State College. All three were scheduled speakers. Other members attending included Past-President Malcolm Pirnie and Carleton Proctor, both of New York City, and J. E. Jagger, Assistant Secretary, ASCE, who officially represented the Society.

The three-day session culminated in a general gathering in McCarter Theater with Ralph E. Flanders, the 1944 recipient of the Hoover Medal, delivering the key address on "Engineering and Human Affairs." Brief talks by foreign engineers comprised the balance of the program. These were given by Sir Harold Hartley, chairman of the British European Airways, London; Francisco Gomez-Perez, Assoc. M. ASCE, past-president of the Mexican Association of Engineers and Architects, Mexico City; and Te Pang Hou, of the Universal Trading Corporation, China.

CIO Unit Notes Receiving Latin-American "Assist"

SOME LIGHT on methods and attitudes is shed by a press release which CIVIL ENGINEERING recently received from Local 231, United Office and Professional Workers of America, CIO, disclosing how a group of engineers has been "organized." To ASCE members striving to retain their own professional attitudes in the face of current labor law interpretations, the fact that the CIO press release mentions "strike action" and "professional status" virtually in the same breath, will be particularly interesting. The release, in part, follows:

"Local 231, United Office and Professional Workers of America, CIO, today announced the signing of a collective bargaining agreement covering some 300 engineers, designers, and draftsmen at the Ebasco Services Corporation, an affiliate of Electric Bond and Share, the world's largest public utility holding system.

"Influential in securing the contract was support from the Latin American Confederation of Labor which had been mobilized through CIO's Latin American Affairs Committee, in twelve Latin American countries where Electric Bond and Share has holdings and enterprises.

"Although an NLRB election had been won overwhelmingly by the union, the company had been unwilling to make any bargaining concessions and the engineers and designers had prepared for strike action and obtained international labor cooperation.

"'This demonstration of international trade union support is unique in collective bargaining relations,' the UOPWA vice-president and director of its Technical and Scientific Division declared, 'and is a practical example of how organized labor directly assists technical professional workers to secure economic and professional status.'"

Northwest Publication Lauds ASCE Labor Stand

AN INTERESTING editorial appears in the September issue of the *Northwest Professional Engineer*, published by the Seattle Professional Engineering Employees Association, commenting on the July 10 presentation made by ASCE before a subcommittee of the House Committee on Labor. Detailing the presentation made, which opposed forced grouping of professional and non-professional employees, the editorial concludes:

"Thus the ASCE continues its powerful and courageous leadership in the fight to save professional engineers from being forced into heterogeneous bargaining groups whose interests are incompatible with, and often opposed to, those of professional employees. Let us hope that the other Founder Societies and all engineering organizations everywhere will join in now and convince Congress with overwhelming weight of opinion that ASCE's statement is fundamentally sound and correct, and that the Wagner Act ought to be modified as proposed."

ASA Announces Change in Annual Meeting Dates

THE American Standards Association has announced a change in the dates of its annual meeting, originally scheduled for December 12 and 13. Plans have now been completed for holding the meeting at the Waldorf-Astoria in New York on November 21 and 22. The annual dinner will be given on the Starlight Roof of the Waldorf on the evening of November 22.

N. G. Neare's Column

Conducted by

R. ROBINSON ROWE, M. ASCE

"IF THIS WAS a sermon," warned Professor Neare, "my text would be Tupper's epigram, 'Well-timed silence hath more eloquence than speech.' He could have pointed to Euclid for his model of discretion.

"Euclid, you remember, said that one and only one circle could be drawn thru 3 random points in a plane, and that one and only one sphere could be drawn thru 4 random points in space. In his eloquence he was silent on fixation of squares and cubes.

"Two years ago we looked into the problem for squares and tonite we have the finale: thru how many random points in space may a cube be drawn and how many cubes are fixed by one set of points?"

"Could 7 be the first answer?" asked Joe Kerr. "A square with 4 sides and 4 corners can be drawn thru any 4 points in a plane. A cube has 6 faces and 8 corners, of which the average is 7."

"Seven points?" scoffed Cal Klater. "That's right, but you got it the wrong way. You can't add faces to corners, so there's no mean. It would have been more logical to count the points on opposite faces of a die; fixing those faces fixes the cube!"

"All right, all right," grinned Joe, "but the analogy worked, so I'll try another. If 4 points in 2 dimensions fix 3 × 2 = 6 squares, then 7 points in 3 dimensions fix 6 × 5 × 4 = 120 cubes."

"Only 6 × 5 = 30," said Amos.

"I found 151," yelled Ken.

"I drew 420," bragged Pete.

"No, 4,200!"

"Actually 5,880."

"Double that to 11,760."

"Quiet, quiet," begged the Professor. "This sounds like an auction instead of a sedate session of Engineers. Can you settle it, Cal?"

"You should have let the auction go on, Noah. The bids aren't high enuf yet. I'd like to set up 11 cases and call them:

31-20-10
31-10-11
30-21-10
30-20-11
30-11-11
22-20-10
22-10-11
21-21-10
21-20-20
21-20-11
21-11-11

in which the digits in pairs indicate the number of points in two parallel faces. Numbering faces as on a die, let's call them F_1, F_2. . .F_6. Then Case 1 means 3 points on F_1, 1 on F_6, 2 on F_2 and 1 on F_3.

"For this case, there are 35 combinations of 3 points to determine plane F_1. We can draw a perpendicular plane F_2 thru any 2 points and there are 6 ways of selecting 2 points from the remaining 4. Thru either of the last 2 points we can draw plane F_3 perpendicular to both F_1 and F_2, so we have 2 choices. We now have a trihedral and the distance from the 7th point to F_1 fixes the size of the cube. Since F_5 and F_4 can be drawn this distance either side of F_2 and F_3, the number of cubes for this case is 35 × 6 × 2 × 2 × 2 = 1,680. I've figured all but 2 cases and have more than 11,760 cubes."

"Then let's let the boys have another month finishing it," said the Professor with sinister generosity.

[*Cal Klaters on the first question were: Isidore Knobbe (Joseph S Lambie), A Nuther Nutt (still anonymous) and Anne Othernut (J. Charles Rathbun), whose anne-alysis of the second question has been quoted.*]

E. W. O'Brien Is 1947 Head of Mechanical Engineers

EUGENE W. O'BRIEN, engineering publisher of Atlanta, Ga., has been elected president of the American Society of Mechanical Engineers for the coming year. The new regional vice-presidents, elected to serve two years, are Prof. Linn Helander, of Kansas State College; Thomas S. McEwan, of Chicago; Albert R. Mumford, of New York; Edward E. Williams, of Charlotte, N.C.; and Alton C. Chick, of Providence, R.I.

New in Education~

Engineering Schools Get Surplus Buildings to Care for Veterans

AS PART OF the veterans' educational facilities program, several colleges will receive surplus war buildings for use as classrooms, laboratories, and other purposes except housing. In some cases, the grant of such facilities will enable the colleges to accommodate many more veterans than would otherwise be possible.

To take care of an anticipated enrolment of 6,350 (including 5,025 veterans) at Illinois Institute of Technology, Chicago, Maj. Gen. Philip B. Fleming, M. ASCE, Federal Works Administrator, has authorized the transfer of four temporary buildings from Illiopolis, Ill., to the campus of the institute, for conversion into classrooms. It is expected that the surplus buildings, plus the expansion planned by the institute, will make possible the enrolment of 1,025 additional veterans.

The same situation obtains at Iowa State College, Ames, Iowa, which will receive surplus buildings to provide laboratory and classroom facilities for 1,700 additional veterans. Some of the buildings will come from the Army air base at Sioux City, Iowa, and others from the ordnance plant near Ankeny, Iowa.

Kansas State College of Agriculture and Applied Science, Manhattan, Kans., is still another institution whose facilities will be similarly expanded. Four government-owned surplus buildings, being transferred from the Army air base at Coffeyville to the Kansas State campus, will enable an enrolment of 5,800, including 4,300 veterans.

NEWS OF ENGINEERS

Personal Items About Society Members

Thomas H. MacDonald, Honorary Member of the Society and commissioner of the Public Roads Administration, was recently awarded the Medal of Merit for his wartime highway work. The citation pointed to Mr. MacDonald's program for developing 78,800 miles of military routes in the United States and to his leadership in the building of the Alaska Highway, the Trans-Isthmian Highway, and other strategic roads.

Robert M. Mains, since 1944 engineer in the laboratory of applied physics at Johns Hopkins University, has been appointed assistant professor of civil engineering at Cornell University.

Alvin W. Green and **Howard T. Harstad** have established the engineering firm of Green and Harstad, with offices in Seattle and Tacoma, Wash. The new firm will specialize in water supply, sewerage systems, and industrial waste problems. Mr. Green was formerly sanitary engineer for the city of Tacoma and senior public health engineer for the Washington State Department of Health, while Mr. Harstad recently commanded a construction detachment in the U.S. Coast Guard.

H. S. Hatton is now assistant regional engineer for the Reconstruction Finance Corporation, with headquarters in Dallas, Tex.

Glenn S. Reeves, lieutenant colonel, Army Corps of Engineers, has been assigned to service in Germany. During the war he served in the Pacific Theater and was executive officer to the Director of Security and Intelligence, Second Service Command. Prior to the war he was engineer of port development for the Port of New York Authority.

L. F. Peeler has become connected with the George Dahl architectural firm in Dallas, Tex. Until recently he was junior stress analyst for the Glenn L. Martin Aircraft Corporation in Baltimore, Md.

Felix W. Callahan, previously general superintendent for C. Hunter Strain, of San Angelo, Tex., has become chief of the Materials and Equipment Section of the Federal Works Agency at Fort Worth, Tex.

T. A. Munson, following his discharge from the Army, in which he had the rank of lieutenant colonel, became chief civil engineer for the Dow Chemical Company at Freeport, Tex.

A. A. Jakkula has resigned as professor of structural engineering and vice-director of the Engineering Experiment Station at the Agricultural and Mechanical College of Texas to accept the position of director of research, Texas A. and M. Research Foundation. Dr. Jakkula is the first director of research of the Foundation, which was created in 1944 to promote research and graduate study at the Agricultural and Mechanical College of Texas by means of sponsored research and gifts.

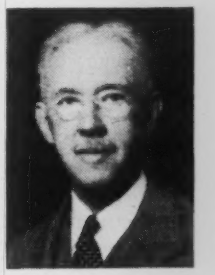
John W. Peerson is now a partner in the recently organized firm of Schmidt, Peerson and Hedman, Chattanooga, Tenn. He was formerly on the staff of the Tennessee Valley Authority.

Ben Moreell

Ben Moreell, who is retiring from active service in the Navy Civil Engineer Corps, has been elected president and a member of the Board of the Turner Construction Company, of New York. During his thirty years of service in the Navy, Admiral Moreell has had many and varied assignments, including that of chief of the Bureau of Yards and Docks during the war years. He is an Honorary Member of the Society. In his new capacity he succeeds J. Archer Turner, who becomes chairman of the Board, replacing **Henry C. Turner**, founder of the organization, who has retired.

Kaiden-Keystone, N.Y.C.

C. Archer Turner



Conway Studios, N.Y.C.

Henry C. Turner

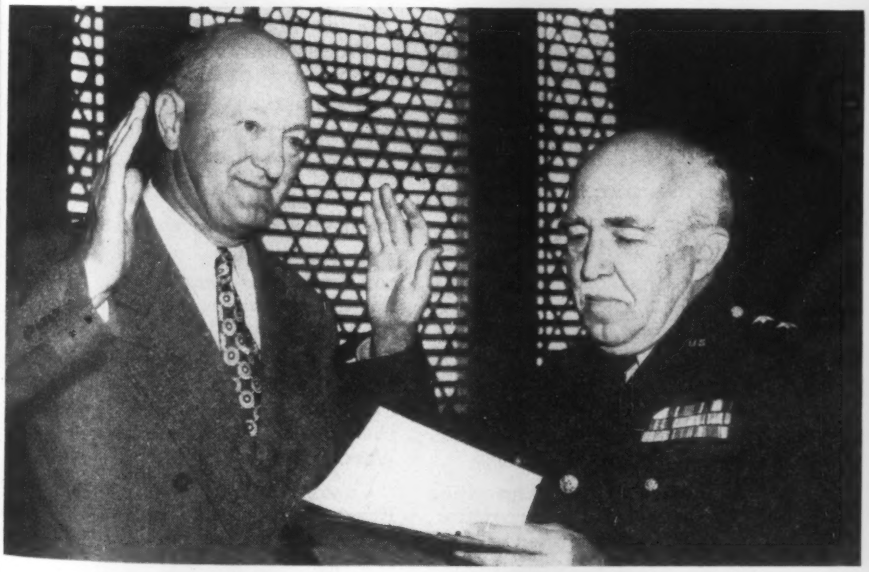
Robert E. Snetzer, lieutenant colonel, Army Corps of Engineers, has been assigned to duty as executive and operations officer for the Seattle District of the U.S. Engineer Office. During the war Colonel Snetzer served overseas with the Second Engineer Combat Battalion.

Emerson C. Itschner, colonel, Army Corps of Engineers, was recently decorated by Lt. Gen. Raymond A. Wheeler, Chief of Engineers, for his wartime services. He received an Oak Leaf Cluster to his Legion of Merit. Among the four civilians honored at the same ceremony was **William H. McAlpine**, chief engineer in the Office of the Chief of Engineers, Washington, who received the Exceptional Civilian Service Award.

R. Gail Baker was recently appointed city engineer of Phoenix, Ariz., and superintendent of streets. A consultant for the Arizona State Land Commission on the Colorado River project and a member of the municipal water commission working on a proposed $5,000,000 water project for the city, Mr. Baker previously served as city engineer.

Thomas A. Nichols, Jr., **Joseph F. Sally**, and **Thomas H. Peterson** have formed Indenco, a company for the practice of civil engineering and industrial design, with headquarters in Oakland, Calif. The firm will specialize in industrial plant layouts, building design, airfields, water supply, sewerage, and sewage treatment. Mr. Nichols was formerly structural engineer for the Austin Company in Oakland, and Messrs. Sally and Peterson are veterans.

James W. Follin, of Washington, D.C., has been appointed assistant administrator of the Federal Works Agency. Mr. Follin has had varied experience in construction and trade association activities and, since 1939, has been managing director of the Producers' Council, Inc., a national organization of manufacturers of building materials and equipment, with headquarters in Washington. He is a member of the Public Works Construction Advisory Committee of the Federal Works Agency.



James W. Follin (Left) Being Sworn Into Office as Assistant Federal Works Administrator
Oath Is Administered by Maj. Gen. Philip B. Fleming

ROBERT E. ANDREWS is retiring from the National Board of Fire Underwriters after thirty-five years of service. Since the establishment of the San Francisco office of the organization in 1921, he has been in responsible charge of all the organization's engineering work on the Pacific Coast. He will make his home in Berkeley, Calif.

JULIUS A. SONNE has accepted an engineering position with the Los Angeles firm of Kistner, Curtis and Wright. During the war he served as a lieutenant in the Navy Civil Engineer Corps.

ARTHUR R. WATSON, following his discharge from the Army Corps of Engineers, has joined the Don Warren Company in San Francisco, as a structural designer and draftsman.

S. ITANI, engineer and contractor of Beirut, Syria, and a member of the Lebanese Government Advisory Board of Engineers, has been assigned to assist in the design of Beirut's new airport.

DAVID L. SNADER was recently appointed professor of civil engineering at Norwich University, Northfield, Vt. He previously held a similar position at Stevens Institute of Technology.

LAWRENCE B. FEAGIN, colonel, Army Corps of Engineers, is returning to his civilian position as chief of engineers in the U. S. Engineer Office at St. Louis, Mo., after serving since 1942 as district engineer in charge of the St. Louis District.

R. STEWART LILLARD, until lately senior engineer for the Federal Works Agency at Nashville, Tenn., has accepted a position with the Resources Utilization Board at Chattanooga, Tenn.

STANLEY BIESACK, previously with the Truscon Steel Company, is now in charge of the Chattanooga, Tenn., office of the Federal Housing Administration.

JESSE E. BUCHANAN is now president of the University of Idaho, having resigned his new post as dean of engineering at Iowa State College. For the past several years Mr. Buchanan has been in the Army Corps of Engineers, and prior to entering the service was dean of the engineering school at the University of Idaho.

JESSE E. BUCHANAN

CLARENCE R. ANDREW IS DECORATED BY COL. D. O. ELLIOTT AT LUNCHEON IN MR. ANDREW'S HONOR

CLARENCE R. ANDREW, head civilian engineer in the U.S. Engineer Office, Chicago, was recently awarded the War Department's Exceptional Civilian Service Award for his services in the Chicago Engineer District during the war. The citation mentions specifically his "services in directing and coordinating all activities necessary to the passage of over 1,000 war vessels through the Illinois Waterway from Lake Michigan to New Orleans. . .and in particular his skill and judgment in directing the modifications necessary to an inland barge waterway to permit such passages. . ."

HANEN H. WILLIAMS has established an engineering practice in Phoenix, Ariz. He was recently released from the Navy Civil Engineer Corps after serving as construction and planning officer for the 102d Naval Construction Battalion in the Southwest Pacific.

T. C. MACNABB is retiring after many years with the Canadian Pacific Railway. At one time he was construction engineer at Winnipeg, Manitoba, and of more recent years has been general superintendent for the New Brunswick region, with headquarters at St. John.

S. S. STEINBERG, dean of the college of engineering at the University of Maryland, has been elected an honorary member of the Association of Engineers and Architects of Mexico. This is the fifth South and Central American country that has similarly honored Dean Steinberg, who last year made a goodwill tour of Latin America for the Department of State.

PAUL D. GREGORY is now associated with the Fort Worth, Tex., consulting firm of Fred E. Hess in the capacity of assistant chief engineer. He was formerly office engineer for the Texas State Highway Department at Fort Worth.

FRANK G. HONEYCUTT, JR., who has just returned from two and a half years' overseas service with the Navy, has taken a position with Rollins and Forrest in Dallas, Tex.

PAUL H. LA ROSEE, formerly supervising engineer for the Defense Plant Corporation, New Orleans, La., is now connected with the J. A. Jones Construction Company, Inc., as chief engineer of the Pan-American Highway project in Ecuador, Section Guamote-El Tambo. His headquarters are at Alausi, Ecuador.

JOHN AMOS ADAMS, JR., until lately hydraulic engineer in the Office of the Chief of Engineers, Washington, is now hydrologist in the flood control division, Intermountain Branch, Forest and Range Experiment Station of the U.S. Forest Service, at Ogden, Utah.

ROY M. HARRIS has resigned as chief of the engineering division of the Washington State Department of Health to become chief sanitary engineer for the Standard Oil Company of New Jersey. His first assignment will take him to Venezuela.

OLAF J. ELLINGSON, formerly city manager of Brownsville, Tex., has become city manager of Key West, Fla.

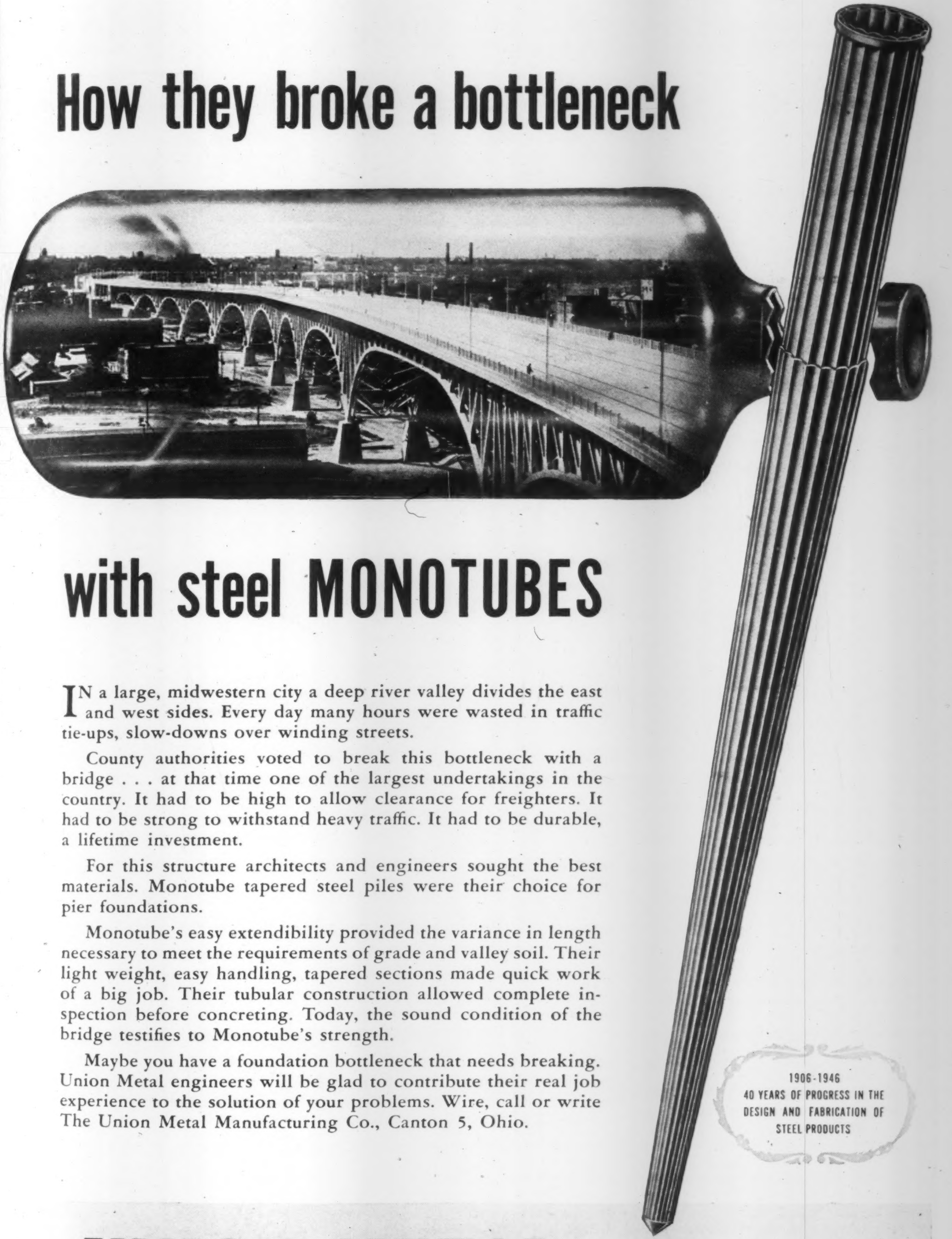
JAMES R. POLLOCK, now on terminal leave after serving as a colonel in the Army Corps of Engineers, has accepted an appointment as the first city manager of Marquette, Mich. Prior to joining the service, he was city manager for Flint and Pontiac, Mich.

B. LOYAL SMITH has returned to his position as county engineer for Walla Walla County, Washington, after serving in the Army Air Corps.

I. G. GRUNDEL, for the past eight years connected with the Amalgamated Sugar Company at Rupert, Idaho, is now chief engineer for the Waverly Sugar Company at Waverly, Iowa.

CHARLES L. HALL, colonel, Army Corps of Engineers, has been assigned to new duties as resident member of the Army's Beach Erosion Board in the Office of the Chief of Engineers, Washington, D.C. Since December 1945 he has been district engineer for the North Atlantic Division, with headquarters in New York.

How they broke a bottleneck



with steel MONOTUBES

IN a large, midwestern city a deep river valley divides the east and west sides. Every day many hours were wasted in traffic tie-ups, slow-downs over winding streets.

County authorities voted to break this bottleneck with a bridge . . . at that time one of the largest undertakings in the country. It had to be high to allow clearance for freighters. It had to be strong to withstand heavy traffic. It had to be durable, a lifetime investment.

For this structure architects and engineers sought the best materials. Monotube tapered steel piles were their choice for pier foundations.

Monotube's easy extendibility provided the variance in length necessary to meet the requirements of grade and valley soil. Their light weight, easy handling, tapered sections made quick work of a big job. Their tubular construction allowed complete inspection before concreting. Today, the sound condition of the bridge testifies to Monotube's strength.

Maybe you have a foundation bottleneck that needs breaking. Union Metal engineers will be glad to contribute their real job experience to the solution of your problems. Wire, call or write The Union Metal Manufacturing Co., Canton 5, Ohio.

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DESIGN AND FABRICATION OF
STEEL PRODUCTS

UNION METAL

Monotube Foundation Piles

DECEASED

Joseph Walker Cotlin (Assoc. M. '26) engineer for the American Cast Iron Pipe Company, Birmingham, Ala., died in that city on September 18. Mr. Cotlin, who was 46, went to Birmingham over twenty years ago as draftsman and designer for the Alabama Power Company. Later he was with the Bureau of Reclamation in Denver. Since 1935 he had been in Birmingham as engineer for the American Cast Iron Pipe Company. He was active in the Alabama Section, which he served as president. He had also been president of the Birmingham Engineers' Club.

Ferris LeRoy Francisco (M. '11) member of the New York engineering and architectural firm of Francisco and Jacobus, died in a hospital in New York on October 11. He was 66. Before forming his firm in 1912 Mr. Francisco was chief engineer for the American Tobacco Company. From 1916 to 1920 he was a member of the board of supervising engineers, Chicago Traction Company, representing the city of Chicago.

Harry Lionel Kadet (Jun. '44) public health engineer, U.S. Public Health Service, Brooklyn, N. Y., died on March 4, 1946, according to word just received at Society Headquarters. Mr. Kadet was 27, and a graduate of the College of the City of New York. He received a master's degree in sanitary engineering from Harvard University in 1944, and later was assistant sanitary inspector at Harvard.

Oscar Lowinson (Assoc. M. '00) retired civil engineer, died at his home in New York City, on September 26, 1946, at the age of 76. For many years Mr. Lowinson maintained an engineering and architectural practice in New York—more recently as a member of the firm of Lowinson and Todaro. His work included the design of many public school buildings in New Jersey and Long Island and hospital buildings in New York.

Marius Ib Nyeboe (M. '06) civil engineer of Copenhagen, Denmark, died there on July 24, 1946. Mr. Nyeboe, who was 79, was born and educated in Denmark. In 1892 he came to the United States, where he was employed by the Elmira Bridge Company, the New York Central and Hudson River Railroad, and various engineering firms. Returning to Denmark in 1898, he established an engineering practice in Copenhagen, with a branch office in Hamburg, Germany. Later Mr. Nyeboe spent a number of years in mining work in Greenland.

Sydney Abram Shubin (M. '32) chief bridge design engineer for Allegheny County, Pennsylvania, died at his home at Dormont, Pa., on September 18. He was 56. Mr. Shubin had been county bridge designer for over twenty-two years, working as chief of the department for the past eleven years. During this long period in office he designed numerous bridge and elevated road structures in Pittsburgh and its vicinity, and at the time of his death was designing bridges to cross the Monongahela River at Dravosburg and Rankin.

R. L. Sackett

Robert Lemuel Sackett (M. '16) dean emeritus of engineering at Pennsylvania State College, died in New York City on October 6, at the age of 79. From 1891 to 1907 Dean Sackett taught at Earlham College, Richmond, Ind., and from 1907 to 1915 was professor of sanitary and hydraulic engineering at Purdue University. In the latter year he went to Pennsylvania State College as dean and director of the Engineering Experiment Station. He retired in 1937 as dean emeritus, and from 1941 to 1945 served as assistant to the secretary of the American Society of Mechanical Engineers during the wartime absence of the secretary. Dean Sackett was active in the Society for the Promotion of Engineering Education, of which he was president in 1927 and 1928, and was the author of a book and many articles on the subject of engineering education.

Sidney Montefiore Siesel (M. '31) president and general manager of the Siesel Construction Company, Milwaukee, Wis., died on September 15, at the age of 57. Mr. Siesel spent his early engineering career in Pittsburgh, establishing his engineering practice in Milwaukee in 1922. He also had an office in Pittsburgh. Mr. Siesel built many of Milwaukee's notable structures; the 27-story Exchange National Bank Building at Tulsa, Okla.; and the foundations for the Congressional Library in Washington. During the recent war he was in charge of the construction of supercharger plants for the Allis-Chalmers Manufacturing Company. At the time of his death he was on the board of directors of the Associated General Contractors of America.

William Theodore Sitt (Assoc. M. '05) of New York City, died on June 15. His age was 71. Early in his career Mr. Sitt was with Wells Brothers, New York consultants, in charge of engineering and construction in states east of the Mississippi. Projects on which he was engaged during this period include the Society's building on 57th Street and the present headquarters on 39th Street. From 1919 to 1924 he was with the New York firm of Marc Eidlitz and Son, and from 1924 to 1930 project manager for James Stewart and Company, also of New York. More recently he had been with the PWA, and in charge of postgraduate courses in building estimating and construction at Pratt Institute in Brooklyn.

Roscoe Chester Sloane (M. '23) professor of highway engineering at Ohio State University, Columbus, Ohio, died there on September 17, 1946. He was 63. Professor Sloane was associated with various industries in his early career, and he joined the engineering staff at Ohio State in 1913. He had been a full professor since 1928. For some years he was in charge of the summer surveying school, and in this capacity handled surveys and plans for the Ohio and West Virginia highway departments.

Frederick Snare (Affiliate '03) chairman of the board of the Frederick Snare Corporation, New York contracting firm, died in Havana, Cuba, on September 22. Mr. Snare, who was 83, was founder of the Frederick Snare Corporation, and served as its president from 1900 to 1927. In the latter year he became chairman of the board. His firm has done engineering and contracting work in steel and concrete on many notable bridges in this country, South America, and Cuba. In recent years he had made his home in Havana, and he was decorated twice by the Cuban government—for his contribution to the economic growth of that country and as the American who had done most to develop social and cultural relations between the United States and Cuba.

Wolfgang Gustav Triest (M. '05) of Great Neck, N.Y., died in a hospital at Mineola, N.Y., on September 21, 1946, at the age of 83. Mr. Triest was a partner in the Snare and Triest Construction Company in New York until 1919, when he dissolved the partnership to become president of the Triest Contracting Corporation. He retired in 1940. Construction projects handled by Mr. Triest included the Cunard Line piers, approaches to the Hell Gate and Goethals bridges, sections of the Catskill Aqueduct and of the Independent Subway system in Long Island, and industrial buildings in Boston, Brooklyn, and Philadelphia. During the first World War he built a Navy cantonment at Hog Island.

Martin Jacob Ungrich (Assoc. M. '10) president of Martin Ungrich, Inc., New York City, died on July 24. He was 66. Beginning in 1907, Mr. Ungrich was for a number of years assistant engineer for the New York Board of Water Supply, working on the Catskill Aqueduct and other projects. For the past twenty years he had been president of his own company.

Alfred Rutgers Whitney (M. '16) retired construction engineer of New York City, died in a hospital there on October 7, as the result of being struck by an automobile a few days earlier. Mr. Whitney, who was 78, became a member of the New York firm of A. R. Whitney, iron and steel manufacturers and contractors, in 1894. Later the firm was incorporated as the Whitney Company, Mr. Whitney being president of the organization until 1926, and chairman of the board from then until his retirement in 1929. A veteran of Squadron A of the New York National Guard, Mr. Whitney was a major on the staffs of several governors, and during the first World War he was an aide in the Bureau of Naval Intelligence. He was the author of books on engineering, travel, and sports.

Lawrence Richard Young (M. '35) vice-president and general manager of the International Engineering Company, Inc., of Denver, Colo., died there on August 24. He was 48. From 1922 to 1929 Mr. Young was with the Power Corporation of New York at Watertown, N.Y., on hydroelectric development, and from 1930 to 1940 he was in the U.S. Engineer Office—for part of this period as principal assistant at Zanesville, Ohio, on the Muskingum River Flood Control and Water Conservation Project. More recently he had been with Morrison-Knudsen, Inc., at Boise, Idaho.

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Changes in Membership Grades

Additions, Transfers, Reinstatements, and Resignations

From September 10 to October 9, 1946, Inclusive

ADDITIONS TO MEMBERSHIP

Alspaugh Alton Emanual (Assoc. M. '46), Associate Engr., U.S. Army Engrs., 628 Pittock Bldg. (Res., 1915 North East 38th), Portland 13, Ore.

Barnes, Floyd Powell (Jun. '46), Tech. Sgt., U.S. Army; Route 4, Henderson, N.C.

Bennion, Vernal Rowland (Assoc. M. '46), Dist. Engr., U.S. Geological Survey, Box 37, College Park, Md.

Bentz, Warren Worthington (Jun. '46), Junior Structural Engr., Office of the Municipal Archt., Old Dist. Bldg., 13th and 14th on Pennsylvania Ave. (Res., 4610 South Dakota Ave.), Washington 17, D.C.

Biggers, John Tollie (Jun. '46), Graduate Student, Univ. of Illinois, Urbana (Res., 160 North Stevens, Springfield), Ill.

Brown, Frederick Prescott (M. '46), Office Engr., International Boundary & Water Comm., U.S. and Mexico, 627—First National Bank Bldg. (Res., 2631 Copper St.), El Paso, Tex.

Brunet, Edmund Albert (Jun. '46), 727 South Philadelphia St., Anaheim, Calif.

Brunn, Gustav A. (Assoc. M. '46), Mech. Design Engr., Standard Oil Co. (Ind.), Sugar Creek (Res., 1300 East 59th St., Kansas City), Mo.

Brunn, Sig Richard (Assoc. M. '46), (S. R. Brunn Constr. Co.), 5808 Garfield, Kansas City, Mo.

Buchanan, Robert Duncan (Jun. '46), Highway Engr., State of Illinois, 205 West Monroe St. (Res., 5859 North Kolmar Ave.), Chicago, Ill.

Burroughs, Max Albert (Jun. '45), 901 North 7th, Beatrice, Nebr.

Carlson, Warren Ore (Jun. '46), 606 East 9th St., McMinnville, Ore.

Chatfield, Robert Bruce Wallace (Jun. '46), Student, Harvard Graduate School of Engr., 11 Gray Gardens West, Cambridge, Mass. (Res., Willow Hills Lane, Cincinnati 27, Ohio.)

Clark, John Wood (Jun. '46), Student, Dept. of Eng. Mechanics, Purdue Univ. (Res., 279 Littleton St.), West Lafayette, Ind.

Dickman, Norman Henry (Jun. '46), Junior Engr. and Timekeeper, Bethlehem Pacific Coast Steel Corp., 11100 South Central Ave. (Res., 125 Witmer St.), Los Angeles 26, Calif.

Dodd, Jack Gordon (M. '46), Comdr., CEC, U.S. Navy, Public Works Officer, Naval Air Station, Norfolk, Va.

Essayan, Edward (Jun. '46), Junior Engr., The Brooklyn Union Gas Co., 176 Remsen St. (Res., 439 Second St.), Brooklyn 15, N.Y.

Fuller, Thomas Lester (Jun. '46), Graduate Student, Univ. of Texas; 512 Academy Drive, Austin, Tex.

Gambrell, Roderick Dhu, Jr. (Jun. '46) Asst. Supt. of Constr., Veterans Administration, Branch Office No. 10 (Res. 4806 Swiss Ave.), Dallas 4, Tex.

Gilday, John Francis (Jun. '46), 361 West 25th St., New York 1, N.Y.

Gleason, William Clarence (Jun. '46), Structural Engr., The Austin Co., 16112 Euclid Ave., Cleveland (Res., 119 Nelson St., Painesville), Ohio.

Goldman. Stanley (Jun. '46) Junior Engr., Robinson & Steinman, 117 Liberty St., New York (Res., 3185 Bedford Ave., Brooklyn), N.Y.

Goodman, Alvin Solomon (Jun. '46), Lt., U.S. Army; 2857 Valentine Ave., New York 58, N.Y

Huckins, Julian Greenway (M. '46), Engr. (Relocation), Corps of Engrs., U.S. Army, 601 Davidson Bldg. (Res., 4507 Roanoke Parkway), Kansas City 2, Mo.

Jurach,Paul John (Jun. '46), Graduate Student, Univ. of California; 1622 Fourteenth St., Sacramento, Calif.

Kindel, William Eugene (Jun. '46), 415 South Ardmore Ave., Villa Park, Ill.

Linford, Preston Dee (Jun. '46), Instr. of Civ. Eng., Univ. of Utah, Salt Lake City (Res., 2843 Eccles Ave., Ogden), Utah.

McCarthy, James Lee (Jun. '46), Student; 512 Fifth St. North, Great Falls, Mont.

McClelland, Bramlette (Jun. '46), Cons. Engr. (Greer & McClelland), 2649 North Main, Houston 9, Tex.

Miller, George Erwin (Jun. '46), with Dist. Office, U.S. Corps. of Engrs. (Res., 7157 North 30th St.), Omaha, Nebr.

Morgan, James Markus, Jr. (Jun. '46), Care, Dept. of Civ. Engr., Virginia Military Inst., Lexington, Va.

Nichols, Vladimir Nicholas (Assoc. M. '46), Gen. Mgr., Geo. W. Rogers Constr. Corp., 6 Church St., New York (Res., 86—15 Elmhurst Ave., Elmhurst), N.Y.

Olmstead, Frank Robert (M. '46), Engr., Public Roads Administration, Washington, D.C. (Res., 3503 South Wakefield St., Arlington, Va.)

Page, John Morgan (Jun. '46), Junior Hydr. Engr., War Dept., U.S. Engr. Dept., 741 South Figueroa St. (Res., 416 South Grandview St.), Los Angeles 5, Calif.

Perry, Robert Blakeley, Jr. (Jun. '46), Student, 1317 North Crescent Heights Blvd., Los Angeles 46, Calif.

Rau, John August (Assoc. M. '46), Chf. Engr., Allison Steel Mfg. Co., Box 2151 (Res., 518 West Monte Vista Rd.), Phoenix, Ariz.

Reichel, Harold LeRoy (Assoc. M. '46), Logging Engr., Weyerhaeuser Timber Co., Vail (Res., Box 46, Rainier), Wash.

Ricciardi, Vincent Ralph (Jun. '46), Structural Draftsman, Johns-Manville, Inc., Manville, N.J. (Res., 461 Union St., Brooklyn 31, N.Y.)

Robinson, William Harold (Jun. '46), (W. R. Robinson Co.), Box 727 New Castle, Wyo.

Rosenvinge, Cedric Louis (Assoc. M. '46), with E. Jeffcock & Co. (Contrs.), Ltd. (Res., 1 Kingsland, Jesmond), Newcastle on Tyne 2; England.

Royce, Robert Fredrick (Jun. '46), Lakeside, Mich.

Shepard, Elmer Ralph (Jun. '46), Asst. City Engr., City of Longview, City Hall (Res., Longview Hotel), Longview, Wash.

Shire, Albert Charles (M. '46), Chf., Div. of Inventions and Eng., Office of Technical Services, Dept. of Commerce, Washington 25, D.C.

Skiles, James Joy (Jun. '46), Civ. Engr., Bureau of Reclamation, Hunt, Idaho.

Soderberg, Richard Reuben (Jun. '46), Graduate Student-Teacher, Univ. of Southern California, 937 West 37th St. (Res., 6821 North Figueroa St.), Los Angeles 42, Calif.

Spamer, James Sloan (Jun. '46), Instr., Civ. Eng., College of Eng., Univ. of Maryland, College Park, Md.

Tracy, James Bendel (M, '46), Engr., Stanley Eng. Co., Cons. Engrs., Hershey Bldg. (Res., 108 Laurel Ave.), Muscatine, Iowa.

Van Derzee, John William (Assoc. M. '45), Capt., Corps of Engrs., U.S. Army, 1111 North Pitt St., Alexandria, Va.

Vogler, Robert Llewellyn (Assoc. M. '46), Archt.-Engr., 225 Oleander Ave., Corpus Christi, Tex.

Walker, Murray Graham (Assoc. M. '46), Engr., State Div. of Hydraulics, Room 419 Transportation Bldg. (Res., Route 2, Box 26), Olympia, Wash.

Watts, Harrison Davenport, Jr. (Assoc. M. '46), (Watts Eng. Co.), Redding Bldg., Waycross, Ga.

Wilson, Charles (Jun. '44), (Wilson Eng. Co.), 1128 North Tyndall, No. 2, Tucson, Ariz.

Zeigler, Edward James (Jun. '46), Asst. Research Engr., National Sand and Gravel Assn., Univ. of Maryland (Res., Terrapin Inn), College Park, Md.

MEMBERSHIP TRANSFERS

Byrne, Thomas Gorman (Jun. '35; Assoc. M. '46), Lt. Comdr., U.S. Coast Guard, Coast Guard Base, Ketchikan, Alaska.

Cushing, Jerome James (Jun. '37; Assoc. M. '46), Estimation Engr., 7530 North Sheridan Rd., Chicago, Ill.

Elgin, Robert Lewis (Jun. '37; Assoc. M. '46), Representative, The James Foundation, Box 194, St. James, Mo.

Ettlinger, William DeRoy (Jun. '31; Assoc. M. '39; M. '46), Civ. Engr., United Merchants Laboratories, Inc., 601 West 26th St., New York (Res., 15 Connecticut Ave., Long Beach), N.Y.

Erickson, Harry Wilbert (Jun. '33; Assoc. M. '46), Civ. Engr., P-4, U.S. Engrs., Textile Tower (Res., 5119 Angeline St.), Seattle 8, Wash.

Feren, John Michael (Jun. '42; Assoc. M. '46), Job Engr., Swinerton & Walberg Co., 225 Bush St., San Francisco (Res., 231 Drake St., Antioch), Calif.

Ferrer-Vaillant, Alberto (Jun. '38; Assoc. M. '46), Bridge and Bldg. Engr., Ferrocarriles Consolidados de Cuba (Res., Avellaneda 272), Camagiiey, Cuba.

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AN UNUSUAL WATERPROOFING PROBLEM:

Holding Back a 4ft. High Tide IN AN ELEVATOR PIT!

The PROBLEM: To control water seepage in the elevator pit of the Barnum Garage, Bridgeport, Conn. Located directly over an old river bed, the pit daily filled with water up o four feet when the tide came in. Continual seepage caused cables and mechanism to rust; breakdowns were frequent. After so-called "waterproofing paints" were proven ineffective, a three-feet-in-diameter sump pump well was installed with an oversized pump, having a two-inch main. The pump worked constantly; literally it was pumping a river. But even this did not work, because of mechanical and electrical failures.

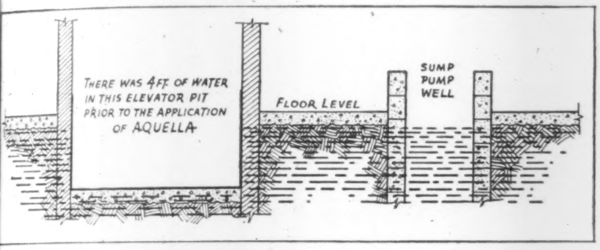
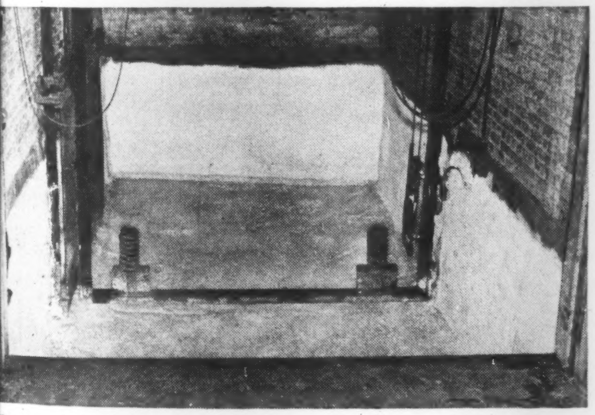

THERE WAS 4FT. OF WATER IN THIS ELEVATOR PIT PRIOR TO THE APPLICATION OF AQUELLA
FLOOR LEVEL
SUMP PUMP WELL

Diagram illustrating the problem.

The SOLUTION: The application of AQUELLA



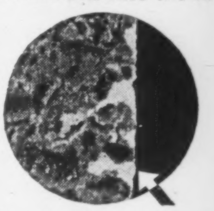
he elevator pit after it was treated with Aquella in January, 1945. According to L. Levitt, garage operator, it hasn't leaked since it was Aquellized 20 months ago.

The RESULT: As Mr. L. Levitt, operator of the garage, describes it: "Since January 1945, when the elevator pit was Aquellized, we have had the sump pump disconnected—even though the water in the sump pump well rises up to the cellar loor level. This proves that the floor and walls of the pit are urrounded by water held back by Aquella."

The REASON for Aquella's effectiveness in holding back a 4-ft. high tide in this elevator pit centers around the entirely new principle on which it works...a principle that distinguishes it in *three ways* from the so-called "waterproofing paints." First, the ingredients of which Aquella is composed are so *finely ground* that they penetrate the masonry *intensely* to fill and close the most microscopic pores. Second, Aquella is scrubbed into the face of the masonry—not just "brushed on" to coat the outside surface. Third, Aquella has an exclusive chemical property which causes it to expand and set up a harder, firmer bond when water contacts it.

The sump pump well is no longer used. Pump was disconnected months ago. Water still rises to the floor level as can be seen in the above photograph—proving that the floor and walls of the pit are still surrounded by water held back by Aquella.

As it cures, Aquella leaves a beautiful white finish that does not powder, peel, flake or rub off, and can be painted over with any color.



Photographic enlargement of a small, sawed-away section of a concrete masonry unit showing the way Aquella penetrates to fill and close the pores of the surface.

Specify AQUELLA for the treating of all porous masonry surfaces, such as brick, concrete, light weight masonry units, stucco or cement plaster.

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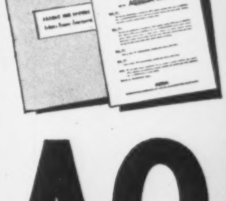

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AQUELLA

Lancaster, Dale Marion (Jun. '40; Assoc. M. '46), Engr., Bureau of Reclamation, Bldg. 1-B Denver Federal Center, Denver, Colo.

Last, Irving (Jun. '32; Assoc. M. '46), Civ. Eng. Draftsman, Borough Pres. of Manhattan, City of New York, Municipal Bldg. (Res., 1152 Nelson Ave.), New York 52, N.Y.

McNair, Arthur James (Jun. '34; Assoc. M. '46), Associate Prof. of Civ. Engr., Univ. of Colorado, Boulder, Colo.

McLeroy, John Otto (Jun. '38; Assoc. M. '46), Equipment Engr., Austin Bridge Co., Box 1590, Dallas 1, Tex.

Meserve, Earl Charles (Jun. '41; Assoc. M. '46), Hydr. Engr., U.S. Engrs., 300 Broadway, Little Rock, Ark.

O'Keefe, John Herman (Jun. '38; Assoc. M. '46), Asst. Hydr. Engr., Water Resources Branch, U.S. Geological Survey, 302 East State St. (Res., 109 Irving Pl.), Ithaca, N.Y.

Peterson, Carl Hilmer Jr. (Jun. '38; Assoc. M. '46), Field Engr., Howard-Needles-Tammen & Bergendoff, Box 176, Kennebunk, Me.

Saltman, Armand (Jun. '39; Assoc. M. '46), Master Sgt., U.S. Army; 1941 North Commonwealth Ave., Los Angles 27, Calif.

Strasser, William Conrad (Jun. '40; Assoc. M. '46), Project Engr., Swartout & Rowley, Gen. Contrs., Care, General Foods Corp. (Res., 228 East Ave.), Albion, N.Y.

Toler, George Gatlin (Jun. '24; Assoc. M. '27; M. '46), Cons. Engr., Box 1137, Ada, Okla.

Vargas, Carlos Guillermo (Jun. '38; Assoc. M. '46), Engr., Compania Constructora de la Costa, Apartado 320, Barranquilla, Colombia.

Walker, Harley Reginald (Jun. '39; Assoc. M. '46), Pres.-Gen. Mgr., The Walker Co., Box 7544, Houston 7, Tex.

TOTAL MEMBERSHIP AS OF OCTOBER 9, 1946

Members	6,370
Associate Members	8,215
Corporate Members	14,585
Honorary Members	36
Juniors	6,296
Affiliates	75
Fellows	1
Total	20,993
(October 9, 1945	20,958)

Wankmuller, Jacob William Thomas (Jun. '35; Assoc. M. '46), Superv. Engr., Federal Works Agency, Bureau of Community Facilities, Box 668 (Res., Box 211), Williamsburg, Va.

Wojdygo, Joseph Mortimer (Jun. '28; Assoc. M. '40; M. '46), Asst. Civ. Eng., The Sanitary Dist. of Chicago, 910 South Michigan Ave. (Res., 3346 North Springfield Ave.), Chicago 18, Ill.

REINSTATEMENTS

Barrus, Arthur William, Assoc. M., reinstated Sept. 30, 1946.

Brookshire, Robert Raymond, Jun., reinstat Sept. 30, 1946.

Bullen, Carroll Alling, Assoc. M., reinstat Sept. 23, 1946.

Clark, George Edward, Assoc. M., reinstated O 2, 1946.

Close, Charles Edward, Assoc. M., reinstat Sept. 24, 1946.

Davis, William, Jun., reinstated Oct. 7, 1946.

Dodge, Eldon Raymond, Assoc. M., reinstat Mar. 18, 1946.

Eager, Vernon Milton, M., reinstated Sept. 1946.

Hill, George Mitchell, Assoc. M., reinstat Sept. 26, 1946.

Keller, Harry Otto, Jun., reinstated Oct. 1, 19

Lorence, Walter Ernest, M., reinstated Oct. 1946.

Maley, William Teahen, Jr., Jun., reinstat Oct. 7, 1946.

Martin, Robert Joseph, Jr., Jun., reinstat Sept. 26, 1946.

Moeller, Clifford Merrill, Jun., reinstat Sept. 26, 1946.

Ward, James Raymond, Jun., reinstated Oct. 1946.

Wolfsheimer, Frank, Jun., reinstated Oct. 7, 19

RESIGNATIONS

Clingerman, John Wakefield, Jun., resigned A 29, 1946.

Strong, Sheldon Arthur, Jun., resigned Sept. 1946.

Walters, John William, Assoc. M., resigned Ju 19, 1946.

Applications for Admission or Transfer

NOVEMBER 1, 1946

NUMBER 11

The Constitution provides that the Board of Direction shall elect or reject all applicants for admission or for transfer. In order to determine justly the eligibility of each candidate, the Board must depend largely upon the membership for information.

Every Member is urged, therefore, to scan carefully the list of candidates published each month in CIVIL ENGINEERING *and to furnish the Board with data which may aid it in determining the eligibility of any applicant.*

It is especially urged that a definite recommendation as to the proper grading be given in each case, inasmuch as the grading must be based upon the opinions of those who know applicant personally as well as upon the nature and extent of his p fessional experience. Any facts derogatory to the personal character professional reputation of an applicant should be promptly commu cated to the Board. Communications relating to applicants are c sidered strictly confidenti

The Board of Directi will not consider the app cations herein contained fr residents of North Amer until the expiration of days, and from non-reside of North America until expiration of 90 days fr the date of this list.

MINIMUM REQUIREMENTS FOR ADMISSION

Grade	General Requirement	Age	Length of Active Practice	Responsible Charge of Work
Member	Qualified to design as well as to direct important work	35 years	12 years	5 years
Associate Member	Qualified to direct work	27 years	8 years	1 year
Junior	Qualified for subprofessional work	20 years	4 years	
Affiliate	Qualified by scientific acquirements or practical experience to co-operate with engineers	35 years	12 years	5 years

APPLYING FOR MEMBER

AGE

Andrus, Leonard Alexander, Portland, Ore. (63)

Bottoms, Eric Edmund (Assoc. M.), Arlington, Va. (41)

Briley, Harold Dale (Assoc. M.), Daytona Beach, Fla. (38)

Bustamante Vasconcelos, Manuel Jose, Mexico, D.F., Mex. (46)

Calkins, Paul Sylvester, Detroit, Mich. (44)

Carmichael, Henry Saint George Tucker, Jr., San Francisco, Calif. (39)

Causey, James Campbell, Jr., Suffolk, Va. (44)

Curradi, Alfred Dean, Chicago, Ill. (37)

Dean, Anthony Porter (Assoc. M.), San Francisco, Calif. (49)

Engle, James Wallace, Arlington, Va. (50)

Feldrappe, Max George (Assoc. M.), Lakewood, Ohio (58)

Hall, Raymond Edward, Toledo, Ohio (40)

Houston, Robert Bruce (Assoc. M.), Kansas City, Mo. (58)

Keogh, Harold James, Wayne, Mich. (50)

Leliavsky, Serge (Bey), Cairo, Egypt (55)

Magnel, Gustave, Ghent, Belgium (57)

Maier, Franz Joseph (Assoc. M.), Bethesda, Md. (37)

Pratt, Edmund Addison (Assoc. M.), Scotch Plains, N.J. (59)

Roberts, Henry Wale, Richmond, Va. (47)

Sanders, Ira Taylor, New York City (49)

Severud, Fred Nicholas (Assoc. M.), Larchmont, N.Y. (47)

Sexton, Cyril George, Bombay, India (42)

Spelman, Malcolm Stewart (Assoc. M.), Rockville Centre, N.Y. (46)

Sprenger, Harold, Santa Ana, Calif. (57)

Swertz, Frank Alfred, Rockaway Point, N.Y. (58)

Timothy, Patrick Henry, Fort Belvoir, Va. (69)

Weaver, Carl Jerome, St. Louis, Mo. (39)

White, Robert Patton, Gattlinburg, Tenn. (59)

APPLYING FOR ASSOCIATE MEMBER

Able, Thomas Andrew, Jr. (Jun.), Greenville, S.C. (47)

Alexander, Geoffrey Newman, Victoria, Australia (38)

Antoni, Charles Michael, Ithaca, N.Y.

Basman, Sabahattin Ali, Chicago, Ill.

Beeney, Herbert Kester, Omaha, Nebr.

Behrend, Carl Louis, San Bernardino, Calif.

Benson, Manuel Albert, Indianapolis, Ind.

Bottoms, Robert Gale (Jun.), Flint, Mich.

Bowman, Joseph Richmond (Jun.), Chicago, Ill.

Buren, Clarence Willard (Jun.), Chicago, Ill.

Carniglia, Joseph William (Jun.), Redding, Calif.

Caughran, Gilbert Wood (Jun.), Alameda, Calif.

Curry, Thomas Sherrod, Jr. (Jun.), ElPaso, Tex.

Daniels, Albert William, San Diego, Calif.

Dickinson, William Dewoody, Jr., Little Rock, Ark.

Diver, Harrison Morton, Jr. (Jun.), Baltimore, Md.

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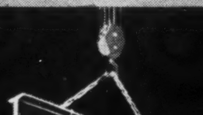

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Johnson, Harvey Henry, Seattle, Wash. (31)

Jones, Joseph Eugene, Albuquerque, N.Mex. (43)

Jones, Thomas Warburton, Sr., Baltimore, Md. (37)

Kaufman, Samuel Henry, Dana, Ind. (32)

MacKichan, Kenneth Allen (Jun.), Charleston, W.Va. (35)

McMillan, Ronald James, Palmerston North, New Zealand (30)

McNamara, Edward Joseph, Port Sulphur, La. (31)

Messinger, Henry McClure (Jun.), Bastrop, La. (34)

Minturn, George Monroe, Pasadena, Calif. (34)

Monroe, Stanley Gray, Dallas, Tex. (44)

Orman, James Melvin, Dallas, Tex. (39)

Perry, Cleo Reginald, Knoxville, Tenn. (33)

Priddle, Raymond Arthur, Sydney, Australia (33)

Ralph, George Brehaut, Beverly Hills, Calif. (40)

Robbins, Daniel Maurice, Omaha, Nebr. (31)

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Siess, Chester Paul (Jun.), Urbana, Ill. (30)

Sims, Flournoy William (Jun.), Little Rock, Ark. (34)

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Thommen, Louis Aloysius (Jun.), Forest Hills, N.Y. (31)

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Witte, Martin Winkelman, Bronx, N.Y. (28)

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Makzoumi, Mohamed H., Ann Arbor, Mich. (24)

Milaeger, Ralph Eugene, Milwaukee, Wis. (26)

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Omachi, Henry Takashi, San Francisco, Calif. (26)

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Belgin, Adil (26

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McCormack, Terence Kevin (20

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Johnson, Claus Paul (31

UNIV. OF TEX.

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RECENT BOOKS

New books donated by the publishers and filed in the Engineering Societies Library, or in the Society's Reading Room. Notes regarding books are taken from the books themselves, edited by the staff of the Society or of the Library. Books in the Library may be borrowed by mail by Society members for a small handling charge

Calculus, 2 ed. By F. H. Miller. John Wiley & Sons, New York; Chapman & Hall, London, 1946. 416 pp., diagrs., tables, $8^1/_2 \times 5^1/_2$ in., cloth, $3.50. This book is designed to give the student a comprehension of the basic concepts and methods of calculus, presenting the subject both as an important branch of mathematics and as a tool for practical use. Additions to the new edition include a discussion of graphical differentiation, a summary of the processes of integration, a discussion of approximate integration, and numerous formulas and theorems.

City and Regional Planning Papers. By Albert Bettman; edited by Arthur C. Comey. Harvard University Press, Cambridge, 1946. 294 pp., 10 × 7 in., coth, $4.50. Papers and addresses by the late Alfred Bettman, lawyer and authority on city planning, comprise this volume. In addition to twenty-four papers, the book includes important law briefs on the constitutionality of zoning, public housing, and slum clearance that were used in final arguments before the U.S. Supreme Court. Another section consists of the presentation of model drafts for statutes.

Design and Construction of Concrete Roads, 2 ed. By R. A. B. Smith and T. R. Grigson. Concrete Publications, Ltd., London, S.W. 1 (14 Dartmouth Street), England, 1946. 208 pp., illus., diagrs., charts, tables, $9^1/_4 \times 6^1/_2$ in., cloth, 8s.6d. Beginning with the siting and planning of highways, this book proceeds to a full discussion of the materials and methods employed in modern highway construction. The treatment is practical throughout, including the brief design chapter. Maintenance and repair are considered, and technical data on concrete testing procedures and soil classification methods are appended.

English-French and French-English Technical Dictionary. By F. Cusset. Chemical Publishing Co., Brooklyn, N.Y., 1946. 590 pp., $6^3/_4 \times 5$ in., cloth, $5. Giving both English-to-French and French-to-English translations, this dictionary covers metallurgy, mining, electricity, chemistry, mechanics, and science. Phrases as well as words are given, in many cases appearing directly under each of the important words. A few basic conversion tables are given at the e of the book.

Mathematical Theory of Elasticity. By I. Sokolnikoff, with the collaboration of R. Specht. McGraw-Hill Book Co., New York a London, 1946. 373 pp. diagrs., charts, tabl $9^1/_4 \times 6$ in., cloth, $4.50. The first three cha ters contain a comprehensive treatment of underlying theory of the mechanics of deformab media. Chapter IV gives an up-to-date tre ment of extension, torsion, and flexure of hom geneous beams. Chapter V contains a devel ment of variational methods necessary for t treatment of problems of elasticity. Seve procedures for deducing approximate solutions the boundary value problems of mathemati physics are outlined and illustrated.

Society for Experimental Stress Analys Proceedings, Vol. 3, No. 2. Edited by Lipson and W. M. Murray. Published and d tributed by Addison-Wesley Press, Inc., Kend Square, Cambridge 42 (Mass.), 1946. 166 p illus., diagrs., charts, tables, $11^1/_4 \times 8^1/_2$ cloth, $5. Eleven papers on various aspects the subject are contained in this volume, togeth with seven papers covering the proceedings o panel discussion of fatigue failure of manuf tured parts. The topics of the first eleven pap include the construction and use of strain ga methods of stress analysis, and a study of t mechanical behavior of the skull and its conte under injuring blows. A list of members and contents pages of the preceding volumes are cluded.

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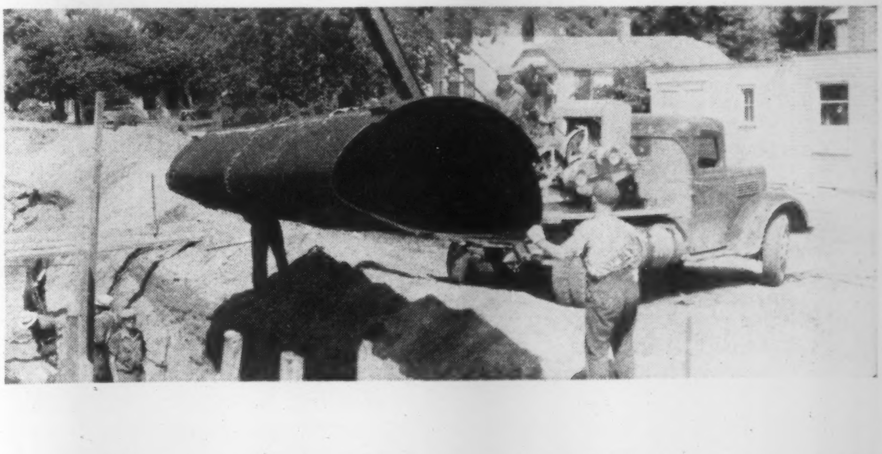

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A weekly bulletin of engineering positions open is available to members of the cooperating societies at a subscription of $3 per quarter or $10 per annum, payable in advance.

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Structural Engineer; Jun. ASCE; age 29; M.S. in C.E., Mass. Inst. of Technology; 9 years' experience in supervision of construction and design on such projects as Sixth Avenue Subway, New York; Panama Canal locks and fortifications; highways and railroad bridges, United States and Central America; industrial buildings and atom bomb plant. Desire supervisory or administrative position in design or construction, metropolitan area or foreign. Will travel. C-318.

Civil Engineer; Jun. ASCE; graduate, 1945; B.S. in C.E.; age 21; married, no children; now assistant public works officer at a large naval air station; one year of experience in Navy Civil Engineer Corps as ensign. Desire administrative or engineering position in United States. C-319.

Civil Engineer; Jun. ASCE; age 29; married; licensed Civil Engineer and Contractor; Lt. Col., Corps of Engrs.; 2 years' experience on river and harbor work, hydraulic dredging; one year on general construction and surveying. Available immediately; will consider foreign service. C-320.

Engineer Executive; Jun. ASCE; commander, CEC, U.S.N.R.; registered professional engineer; age 36; commanding officer, Seabee Battalions; resident engineer and public works executive; wide experience in construction and design of large-scale industrial, commercial, and residential projects. C-321.

Sales Engineer; Jun. ASCE; civil engineering degree; age 26. Has design and construction field experience; 4 years' sales experience. Pleasing personality. Excellent background. Position desired in New York, N.Y. C-322.

Construction Superintendent; Jun. ASCE; 26; married; B.C.E., Cornell University, 1942; 2 years' experience in field engineering and construction plant planning and layout; $2^1/_3$ years' experience as superintendent of heavy construction projects, including $250,000 of marine dredging contracts; desires connection as asst. superintendent or superintendent with marine construction company or foundation company; available at once. C-323.

Civil Engineer; Assoc. M. ASCE; 46; Registered Professional Engineer, State of Pennsylvania; 18 years' experience on construction of roads, bridges, railroads, underground utilities, airfields, and varied heavy concrete structures. Presently employed as chief construction engineer on $100,000,000 project which is nearing completion. Available in 30 days. Desires position of similar nature or as construction superintendent. C-324.

Civil Engineer; Jun. ASCE; 23; married; B.S.C.E., Cornell University, 1945; some experience on design of sewers and sewage treatment plants; 6 months experience in Navy Civil Engineer Corps as Construction Battalion Officer. Desires permanent position in New York Metropolitan area; available immediately. C-325.

Positions Available

Resident Engineer, 35–55, with experience in petroleum refinery construction, to serve as first assistant on staff of company's representative, to follow work of contractors in construction of complete refinery facilities. Must be good organizer and administrator. Duration, several years. Location, Venezuela. W-7899.

Civil Engineer, graduate, single preferred, with some experience in surveying and mapping, for large sugar company. Some knowledge of Spanish desirable. Salary, $2,700–$3,000 a year, plus board. Location, Puerto Rico. W-7912.

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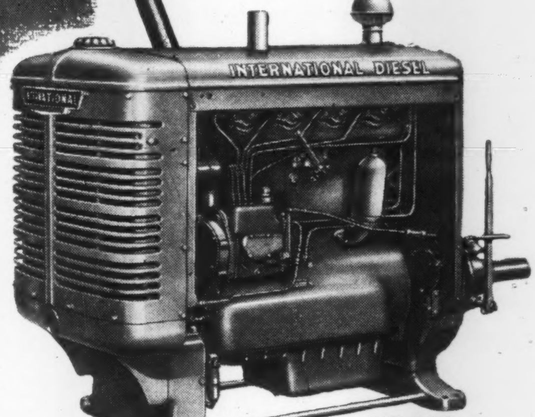
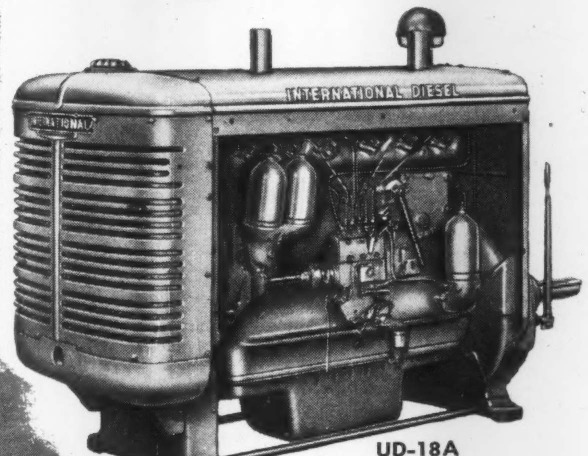


UD-14A



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Instructors. (*a*) Professor, doctor's degree, experience in soil mechanics, to teach undergraduate and graduate courses, and develop a teaching and research laboratory. Salary open. (*b*) Instructor, to teach surveying. Preferably with some experience in advanced and aerial photographic surveying. Salary, $2,000–$2,400 for 9 months, with opportunity to teach during summer. Location, South. W-8011.

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CURRENT PERIODICAL LITERATURE

Abstracts of Articles on Civil Engineering Subjects from Publications (Except Those of the American Society of Civil Engineers) in this Country and Foreign Lands

Selected items for the current Civil Engineering Group of the Engineering Index Service, 29 West 39th Street, New York, N.Y. Every article indexed is on file in The Engineering Societies Library, one of the leading technical libraries of the world. Some 2,000 technical publications from 40 countries in 20 languages are received by the Library and are read, abstracted, and indexed by trained engineers. With the information given in the items which follow, you may obtain the article, from your own file, from your local library, or direct from the publisher, or they may be borrowed from the Engineering Societies Library. Photoprints will be supplied by this library at the cost of reproduction, 25 cents per page to members of the Founder Societies (30 cents to all others), plus postage, or technical translations of the complete text may be obtained at cost.

DAMS

Boulder Dam Project. Boulder Dam—Tailbay and Tunnel Portals Altered, V. B. Uehling. *Western Construction News*, vol. 21, no. 6, June 1946, pp. 85–89. Illustrated description of alterations of tailbay and tunnel portals; work consists of excavating loose fill from river and canyon walls and altering outlet appurtenances of dam for purpose of improving hydraulic characteristics of flow through spillway tunnels; data on road relocation, operation schedule, tunnel construction, and concrete pouring.

Earth, North Dakota. Garrison Dam. *Construction Methods*, vol. 28, no. 6, June 1946, pp. 89–91. Illustrated report on Garrison Dam to be built on Missouri River above Bismarck, N.Dak.; it includes world's largest rolled-fill embankment (75 million cu yd), construction town of Riverdale, railroad connection, and concrete access highway; illustrations present relation of spillway and outlet works to main dam, fill classification, and outlet conduits.

Earth, North Dakota. Garrison Dam on Missouri River to Make Rolled Fill History. *Eng. News-Rec.*, vol. 136, no. 24, June 13, 1946, pp. 920–922. Illustrated report on Garrison Dam 75 miles northwest of Bismarck, N.Dak.; it will be largest rolled fill dam ever attempted; 75,000,000 cu yd of excavation will be taken from spillway and outlet channel cuts.

HYDRAULIC ENGINEERING

Flow of Water, Open Channels. Graphical Calculation of Backwater Eliminates Solution by Trial, F. F. Escoffier. *Eng. News-Rec.*, vol. 136, no. 26, June 27, 1946, p. 981. Explanation of method, by means of which direct calculation of backwater elevations is made possible without use of trials or successive approximations; method can be adapted to most of formulas for flow in open channels.

Hydraulic Gates. Coaster Gate and Handling Equipment for River Outlet Conduits in Shasta Dam, J. E. Warnock and H. J. Pound. *Am. Soc. Mech. Engrs.—Trans.*, vol. 68, no. 3, Apr. 1946, pp. 199–206. Design of Shasta Dam coaster gate used to close intake of any one of eighteen 102-in. conduits in spillway section of dam whenever required for inspection and servicing of control valve and conduit; it may also be used for emergency closure in event of failure of control valve; hydraulic model studies to determine best shape of gate to minimize downpull force in emergency closing.

Ready-Mixed Plants, Iowa. Accurate and Rapid Proportioning of Ready-Mixed Concrete, H. E. Swanson. *Rock Products*, vol. 49, no. 7, July 1946, pp. 62–64 and 98. Illustrated description of operation of new ready-mixed concrete plant in Des Moines, Iowa; data on bulk cement, water measurement, heating aggregates, transit mix, plant design, delivery zones, and balance of plant area.

Research. Iowa Institute of Hydraulic Research. *Iowa Univ.—Studies in Engineering—Bul. No. 30*, 1946, 80 pp. Description of Iowa Institute of Hydraulic Research, including history, organization, activities, physical plant and basic equipment, research facilities, student instruction, institute research and laboratory design; tests and their results are presented in illustrations.

INLAND WATERWAYS

Rivers. Utilization of Rivers in Public Interest, W. W. Horner. *Am. Water Works Assn.—J.*, vol. 38, no. 7, July 1946, pp. 878–882. Public interest requires that utilization of rivers be economically justified and cost equitably distributed among beneficiaries; discussion of activity of River Valley Authorities with special reference to Tennessee Valley Act, and requirements for best plan; coordinating council is recommended.

IRRIGATION

Columbia Basin. Columbia Basin Project Starts This Year, F. A. Banks. *Eng. News-Rec.*, vol. 136, no. 20, May 16, 1946, pp. 780–782; see also *Int. Engr.*, vol. 89, no. 7, July 1946, pp. 12–13. Illustrated description of 1,000,000-acre project, which includes world's largest pumping plant, earth-fill dams, 9 main canals, 46 siphons, 4 tunnels, and pumping plant, partially completed as portion of work on Grand Coulee Dam, will ultimately contain 12 pumps each with capacity of 1,350 cu ft per sec.

Columbia Basin. Construction Begins on Columbia Basin Canal System, R. Laing. *Pac. Bldr. & Engr.*, vol. 52, no. 8, Aug. 1946, pp. 48–51. Illustrated report on starting stage of construction on Columbia Basin Irrigation Project and on difficulties encountered; description of mechanized equipment, and procedure that is to shorten completion time from 700 to 300 days.

Great Plains. More Water for Great Plains, A. W. Emerson. *Concrete*, vol. 54, no. 6, June 1946, pp. 2–5. Discussion of program of Soil Conservation Service (Case-Wheeler program) comprising irrigation projects in 17 Western states; projects located in Montana, Wyoming, North Dakota, South Dakota, and Nebraska illustrated and described.

LAND RECLAMATION AND DRAINAGE

Culverts, Maintenance and Repair. Laying Three 1,000-Ft Steel Pipe Lines in Submerged Culvert. *Eng. News-Rec.*, vol. 136, no. 16, Apr. 18, 1946, pp. 538–539. Illustrated report on laying, under water, 48-in. steel bell and spigot pipe line in 6-ft barrel and backfilling annular space with pumped-in sand at Boston North Station passenger yards; old concrete pipe culvert that had failed was cleaned by drag bucket pulled back and forth by hoisting machine at each end.

Roads and Streets. Drainage Fundamentals, E. L. Worthington. *Roads & Streets*, vol. 89, no. 6, June 1946, pp. 88–94. Discussion of drainage using side ditches, under-drains, interceptor drains, subgrade treatment, shoulder drainage, in slide and slip drainage, culvert drainage, etc. In addition, bridge drainage, abutment drainage, expansion joint drainage and floor drainage are discussed. Extract of Maintenance Manual of West Virginia State Road Commission.

MATERIALS TESTING

Concrete. New Apparatus for Accelerated Freezing and Thawing Tests. *Cement & Lime Manufacture*, vol. 19, no. 3, May 1946, pp. 45–50. Illustrated description of automatic freezing and thawing apparatus devised by Corps of Engineers, U.S. Army; data on freezing and thawing solutions, cold tank and refrigeration equipment, specimen tank, racks and containers, pumps, valves and controls, operation and results. Abstract of Second Interim Concrete Research Report of Control Concrete Laboratory of U.S. Army, Mount Vernon, N.Y.

Road Materials, Asphalt. Behavior of Asphalts in Thin-Film Oven Test, R. H. Lewis and W. J. Halstead. *Pub. Roads*, vol. 24, no. 8, Apr.–May–June 1946, pp. 220–226. Tests on 60–70, 100–120, and 120–150 penetration grades made on samples under same conditions in films $^1/_8$ in. thick; data on source and method of refining asphalt cement, surface hardening, test characteristics of various asphalts, and their residues from thin-film oven tests, effect on ductility-penetration relationship; conclusions drawn from tests.

Soils. Soil Sampling and Testing Instruments. *Roads & Road Construction*, vol. 23, no. 276, Dec. 1945, pp. 403–405, vol. 24, nos. 278 and 279, Feb. 1946, pp. 57–60; Mar., pp. 89–91; and Apr., pp. 134–136. Various types of apparatus for taking and testing of soil samples described; among these are apparatus developed at Massachusetts Institute of Technology, soil dispersion stirrer, and electrically operated apparatus; analysis of soils by pipette method, and significance of sticky point explained.

PORTS AND MARITIME STRUCTURES

Fenders. Suspended Fenders. *Concrete & Constr. Eng.*, vol. 41, no. 6, June 1946, pp. 159–167. Illustrated description of new type of fender (British patent) that is suspended by two upper and two lower links or chains to piers, jetties, landing stages, or dolphins; details of construction given.

Heliogland, Germany. Germany's Island Fortresses—Heliogland. *Engineer*, vol. 181, no. 4710, Apr. 19, 1946, pp. 354–355. Description and map of fortress island; main island has now become experimental bombing range for Royal Air Force; effect of bombing.

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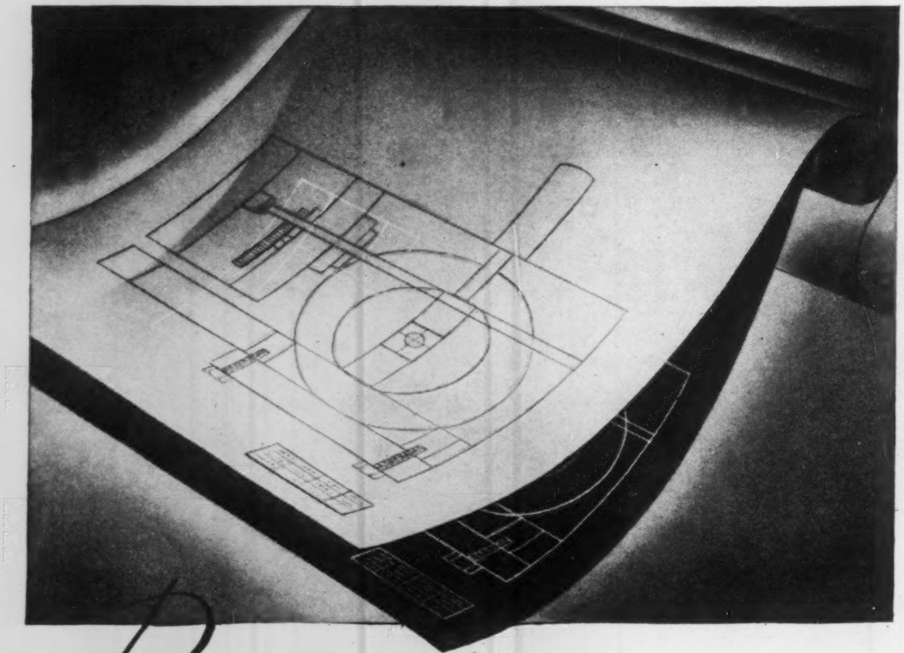

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IMPROVEMENT. Removal of "Ripple Rock." *Engineer*, vol. 181, no. 4704, Mar. 8, 1946, p. 219. Account of problems involved in removal of huge submerged rock located in Seymour Narrows off British Columbia coast opposite city of Victoria; rock is 175 by 250 ft, and reaches to within 10 ft of surface at low water; descriptions of plans for removal.

MELBOURNE, AUSTRALIA. Melbourne Port Peace Plans, C. Lynch. *Shipg. Register & Shipbldr.*, vol. 29, no. 4, Apr. 1946, pp. 22–23, 62, and 64. Brief commentary on preliminary work being undertaken by Melbourne Harbor Trust on $14,400,000 program; plans completed covering installation of more cranes, provision of better docking and wharf facilities generally, and deepening of approach channels.

OIL TANKS. Oil Fuel Storage Tanks and Pipe Lines, S. C. Bailey. *Dock & Harbour Authority*, vol. 26, no. 302, Dec. 1945, pp. 186–190. Design of modern port installations; relative merits of large and small tanks; construction of steel tanks; weight of tank; joints in plates; expansion tank plating; fittings to tanks; snow and wind pressure; painting steel oil tanks; foundations for and erection of steel tanks; reinforced concrete tanks; reservoirs for oil fuel.

RAILROADS, STATIONS, AND TERMINALS

RAILROAD CROSSINGS, GRADE SEPARATION. Railroad Problem—Western Pacific Bisects Sacramento. *Western Construction News*, vol. 21, no. 5, May 1946, pp. 110–114. Recommendations given by ASCE committee on basis of study of problems of bisection of Sacramento, Calif., at grade by main line of Western Pacific Railroad; illustrated description of, and data on, general situation, proposed remedies, protection of existing grade crossing, elevated railroad plan, depot relocation plan, and limited separation plan.

ROADS AND STREETS

AIRPORTS, CLINTON, IOWA. Municipal Airport at Clinton, Iowa, B. R. Anderson. *Pub. Works*, vol. 77, no. 5, May 1946, pp. 31–32. Brief illustrated report on municipal airport at Clinton, Iowa; data on approach area zones, hangars, access roads, and runways.

BUS STOPS. Solving Bus-Stop Problem. *Am. City*, vol. 61, no. 5, May 1946, p. 125. Illustrated description of concrete slabs at bus and trolley coach stopping points; damage of street pavement caused by starting and stopping of heavy vehicles can be avoided by means of "landing strips;" examples from Kansas City, Kans., Wilmington, Del., and Erie, Pa., are presented.

CONCRETE. Factors Influencing Stress in Concrete Pavement from Applied Loads, G. S. Paxson. *Concrete*, vol. 54, no. 5, May 1946, pp. 2–8. Illustrated report on tests designed to provide information on size and shape of contact area of large truck tires under varying loads and inflation pressures, ranging from 50 to 90 lb per sq in.; effect of increase in total load and of subgrade modulus on transverse stresses; effect of pavement thickness.

CONSTRUCTION. Atomic Bomb Highway, L. F. Root. *Construction Methods*, vol. 28, no. 2, Feb. 1946, pp. 82–83, 158, 162, and 164. Illustrated description of construction of highway in New Mexico leading to place where atomic bomb was developed; 6-mile road rose to elevation of 7,216 ft above sea level; dustless wearing surface was achieved by oil process.

DESIGN. Carriageway Areas, A. G. Tyson. *Roads and Road Construction*, vol. 24, nos. 278, 279, and 280, Feb. 1945, pp. 42–46; Mar., pp. 77–81; and Apr., pp. 117–121. Recommendations on all-transitional or partly transitional curves instead of circular arcs at street corners; computation of area of bellmouths at street junctions; derivation of latter, and application to various kinds of transition curves; tables.

MAINTENANCE AND REPAIR. High Early Strength Concrete for Utility Openings and Other Repairs in Cement Concrete Pavements; F. D. Woodruff. *Pub. Works*, vol. 77, no. 5, May 1946, pp. 19–21 and 38–39. Directions are given in detail for repair of openings in concrete surfaces where speed of repair is essential; data on materials, preparation of subgrade, and of concrete at mixing and placing; high early strength concrete should be used.

ROAD MATERIALS, BITUMINOUS. Determination of Binder Content of Bituminous Mixtures, H. M. Croeser. *Roads & Road Construction*, vol. 24, no. 281, May 1946, pp. 159–162. Discussion of formulas in use for calculating binder content of bituminous mixtures, and development of new method; latter is applicable to all types of paving mixtures after completion of preliminary experiments; explanatory charts included. Bibliography.

SNOW AND ICE CONTROL. Ice Prevention on New Hampshire Highways, L. F. Johnson. *Eng. News-Rec.*, vol. 136, no. 14, Apr. 4, 1946, pp. 492–494. Sodium chloride applied directly to center of highways in New Hampshire has prevented ice formation; costs are lower than for application of chloride-treated abrasive which do less satisfactory job; illustrations and comparative cost data.

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STREET LIGHTING, KANSAS CITY, MO. Strictly Modern Lighting System Economically Planned, T. J. Seburn. *Am. City*, vol. 61, no. 4, Apr. 1946, pp. 135 and 137. Comprehensive 5-year plan will relight Kansas City, Mo., for $14.75 per 1,000 lumens against present $47.53; this will be achieved by modern equipment at lower cost and by using lamps of not less than 400 candlepower and many of 1,000 and 1,500 candlepower sizes.

STREET LIGHTING, SYRACUSE, N.Y. Modern Street Lighting System Planned for Syracuse, W. F. Kavanaugh. *Am. City*, vol. 61, no. 3, Mar. 1946, pp. 127–128. Description of modern lighting at Syracuse, N.Y.; data on requirements for safe street illumination, efficiency, and control; discussion of mercury and incandescent lighting.

SEWERAGE AND SEWAGE DISPOSAL

ACTIVATED SLUDGE. Making Activated Sludge Plant Behave. *Am. City*, vol. 61, no. 4, Apr. 1946, pp. 84–86. Illustrated report on activated sludge plant at Hackensack, N.J., presents suggestions for operation under difficult conditions.

GREAT BRITAIN. Sewerage and Sewage Disposal in Retrospect and Prospect, M. Lovett. *Instn. Mun. & County Engrs.—J.*, vol. 72, no. 9, Apr. 1946, pp. 360–375 (discussion), 376–380. Discussion of sewage disposal and community sewerage system and storm water, sewage purification, flow recorders, preliminary treatment of sewage by screens, grit removal and settling tanks, biological treatment, percolating filters, enclosed aerated filters, recirculation, aeration processes, treatment and disposal of sludge, and occupational hazards.

INDUSTRIAL WASTES. Waste Oils Escaping to Surface Waters May Cause Many Kinds of Damage, W. B. Hart. *Nat. Petroleum News*, vol. 38, no. 23, June 5, 1946 (Sec. 2), pp. R467–473. Water used for cooling purposes by plant itself may be contaminated; storm-water wastes may overflow disposal plant and contaminate nearby waters; fire hazards to piers and buildings, from sludgy layers of oil which may also cause corrosion damage to steel structures; films of oil and layers of oil sludge are detrimental to fish and game life, and affect recreational use of waters. Bibliography.

INDUSTRIAL WASTES, RUBBER FACTORIES. Control of Taste and Odor from Industrial Waste, C. D. Adams. *Am. Water Works Assn.—J.*, vol. 38, no. 6, June 1946, pp. 702–709, (discussion), 710–712. Illustrated report on control methods of wastes at synthetic rubber and powder plant, New Albany, Ind.; TNT, synthetic rubber, and acid wastes are considered; discussion of control of after-effects, algae, and bacteria; distribution of residual chlorine; data on results and costs.

SEWAGE FILTERS, TRICKLING. Growth and Distribution of Film in Percolating Filters Treating Sewage by Single and Alternating Double Filtration, T. G. Tomlinson. *Surveyor*, vol. 105, no. 2835, May 24, 1946, pp. 403–406. Study of processes by which film accumulates and is disintegrated, based on observations made at Minworth, England, from 1938–1941, including seasonal variation in concentration of film at surface of single and alternating double filter, rate of growth of film at various temperatures. Bibliography. Before Inst. Sewage Purification.

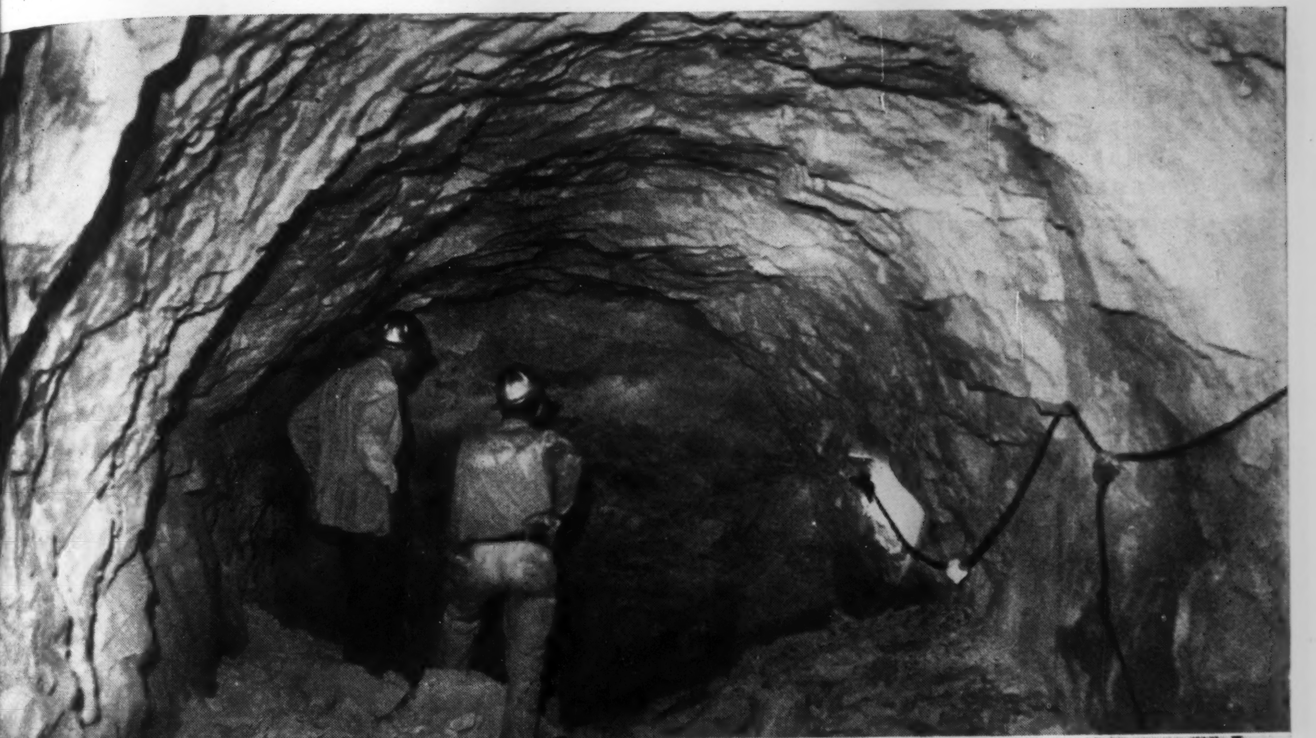
SEWAGE FILTERS, TRICKLING. Sewage Filters Can Take Doubled Load, F. M. Veatch and R. E. Lawrence. *Eng. News-Rec.*, vol. 136, no. 14, Apr. 4, 1946, pp. 488–491. Illustrated report on sewage treatment plant at Fort Sill, Okla., including description of features provided to absorb shock of overloads; discussion of method of operation and flow equalization principles; data on two-stage tricking filters.

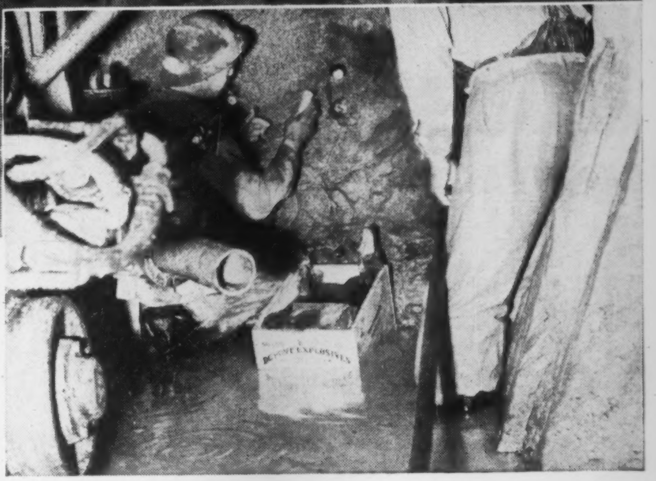
SEWAGE TREATMENT, ENGLAND. Treatment Trends in England, L. B. Escritt. *Sewage Works Eng. & Mun. Sanitation*, vol. 17, no. 6, June 1946, pp. 312–314, and 328. Brief review of development of sewage systems in England; investigation of methods in use, sedimentation practice, aeration, percolating filters, activated sludge treatment, and future tendencies; layout of percolating filter scheme.

SEWERS, MAINTENANCE AND REPAIR. Evergreen Park, Ill., Eliminates Excessive Sewer Infiltration, A. H. Lewis, Jr. *Am. City*, vol. 61, no. 3, Mar. 1946, p. 104. Report on repair of leaky 42-in. reinforced concrete pipe sanitary sewer at Evergreen Park, Ill., including cost data; unusual application of quick-setting cement made possible rehabilitation of sewer.

TREATMENT PLANTS, FLOOD PROTECTION. Flood-Induced Sewerage Improvements. *Am. City*, vol. 61, no. 3, Mar. 1946, pp. 93–94. Illustrated description of operation of sewage treatment plant at Marshalltown, Iowa, during flood period of Iowa River when level of sewage rose high enough to submerge both comminutor motors.

TREATMENT PLANTS, PORT HURON, MICH. Port Huron to Digest Garbage, W. R. Drury. *Sewage Works Eng. & Mun. Sanitation*, vol. 17, no. 6, June 1946, pp. 306–308 and 328. Data on project of sewage treatment plant at Port Huron, Mich., including study of various methods of collecting garbage; grit and screenings disposal, pre- and post-chlorination and digester operation; illustrations present general layout and flow chart showing path of garbage and sewage which combine to produce gas and fertilizer.





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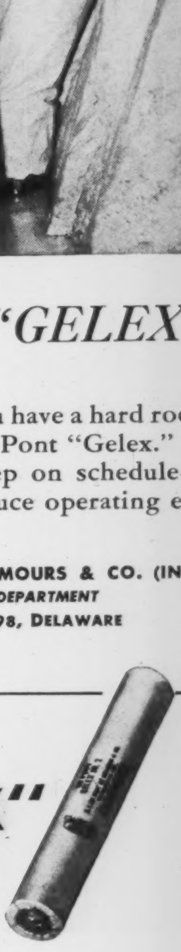

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Treatment Plants, Switzerland. Fuenf Jahre Betriebserfahrung mit der Abwasserklaeranlage des Gaswerks der Stadt Zuerich, M. Wegenstein. *Wasser-und Energiewirtschaft*, vol. 38, nos. 3–4, Mar.–Apr. 1946, pp. 41–44. Illustrated report on experiences in operation of sewage-treatment plant of municipal gas plant at Zurich, Switzerland, including data on effect of settling basins, analysis of sludge, and effect of disturbances in operation.

Water Pollution, Pennsylvania. Stream Pollution in Southwestern Pennsylvania, L. S. Morgan. *Am. Water Works Assn.—J.*, vol. 38, no. 6, June 1946, pp. 713–716. Discussion of pollution of Ohio River, Susquehanna River, Potomac River, and their tributaries; area in question is predominantly industrial in character; type, scope, and magnitude of pollution, sewage, industrial waste, and acid waste considered.

STRUCTURAL ENGINEERING

Beams and Girders, Continuous. Continuous Beams of Non-Constant Section—III, G. P. Manning. *Civ. Eng.* (London), vol. 41, no. 479, May 1946, pp. 184–187. Continuous beams with curved and square splays are treated; theory is applied to numerical examples.

Concrete, Stresses. Shear Stresses in Reinforced Concrete with Particular Reference to Concrete Ships, E. O. Williams. *Instn. Civ. Engrs.—J.*, vol. 26, no. 7, May 1946, pp. 377–383. Study of shear problem in reinforced concrete under various conditions of shear distribution; illustrated report on tests with concrete ships revealing influence of different modular ratios on stress distribution in vertical and diagonal reinforcement of light-weight and gravel concrete.

TUNNELS

Construction. Mystic Cable Tunnel Design and Construction, O. S. Bray. *Boston Soc. Civ. Engrs.—J.*, vol. 33, no. 2, Apr. 1946, pp. 68–81. Discussion of type selection, design, and construction of cable tunnel connecting Mystic Station on north bank of Mystic River in Everett, Mass., with south of river; data on soil, stress analysis, construction, and results of strength tests.

Construction. Tunnelling Through Ages. *Compressed Air Mag.*, vol. 51, no. 3, Mar. 1946, pp. 80–83. Early outstanding tunnels, construction methods, and equipment; contribution of rock drill, compressed air and other mechanical devices to tunnelling progress.

Subway Construction, Great Britain. Ilford Tube, G. L. Groves. *Instn. Civ. Engrs.—J.*, vol. 26, no. 5, Mar. 1946, pp. 6–38 (discussion), 39–49, 6 supp. plates. Illustrated description of tube railway extension of Transport Board's Central Line, from Liverpool Street to Newbury Park, Ilford; data on layout, general construction and special structures, compressed air tunnelling, underpinning of bridge, realinement of existing tunnels, and lengthening of existing stations.

Vehicular. Road Tunnels, H. Criswell. *Roads & Road Construction*, vol. 23, nos. 273, 274, 275, and 276, Sept. 1, 1945, pp. 277–280; Oct. 1, pp. 311–314; Nov. 1, pp. 348–351; and Dec. 1, pp. 387–390. Construction of sub-aqueous tunnels, tunnels under populated areas and those in open country, through hills, ridges, etc., are described and illustrated.

WATER PIPE LINES

Water Wells, Sand Troubles. Preventing Sand and Sediment Deposits, O. A. Gierlich. *Am. Water Works Assn.—J.*, vol. 38, no. 6, June 1946, pp. 772–774. Discussion of most practical and economical method of preventing sand and sediment from wells from entering transmission and distribution mains by prevention of sanding in well proper, and elimination of extraction of sediment and/or sand from pump discharge line before they have entered distribution system.

WATER PUMPING PLANTS

Great Britain. Genesis of Pumping Stations, H. Wallhouse. *Surveyor*, vol. 105, no. 2833, May 10, 1946, pp. 363–366. Brief outline of reasoning behind underground works for new well in Upper Chalk of northwest Middlesex; factors governing selection, methods, and layout of treatment plant; description of site, geophysical survey, vertical investigation, softening method, pressure vs. rapid gravity filters and power supply included. Bibliography. Before Inst. Water Engrs.

Perth Amboy, N.J. Perth Amboy Water Works Coordinates Vacuum and Pressure, J. J. Reager. *Am. City*, vol. 61, no. 3, Mar. 1946, pp. 88–89. Water works at Perth Amboy, N.J., uses vacuum pumps that draw water from large field of shallow wells, and large pressure pump that forces water through transmission mains to distribution system, thus allowing efficient centralization of pumping and control equipment.

Pumps, Centrifugal. Grand Coulee Pumps—1,600 Cfs Each. *Power Plant Eng.*, vol. 50, no. 3, Mar. 1946, pp. 76–77. Installation of four vertical single-impeller centrifugal pumps for irrigation pumping; 12 units ultimately will be placed, each capable of pumping 1,600 cu ft of water per sec (100,000 lb per sec) against 270-ft head,

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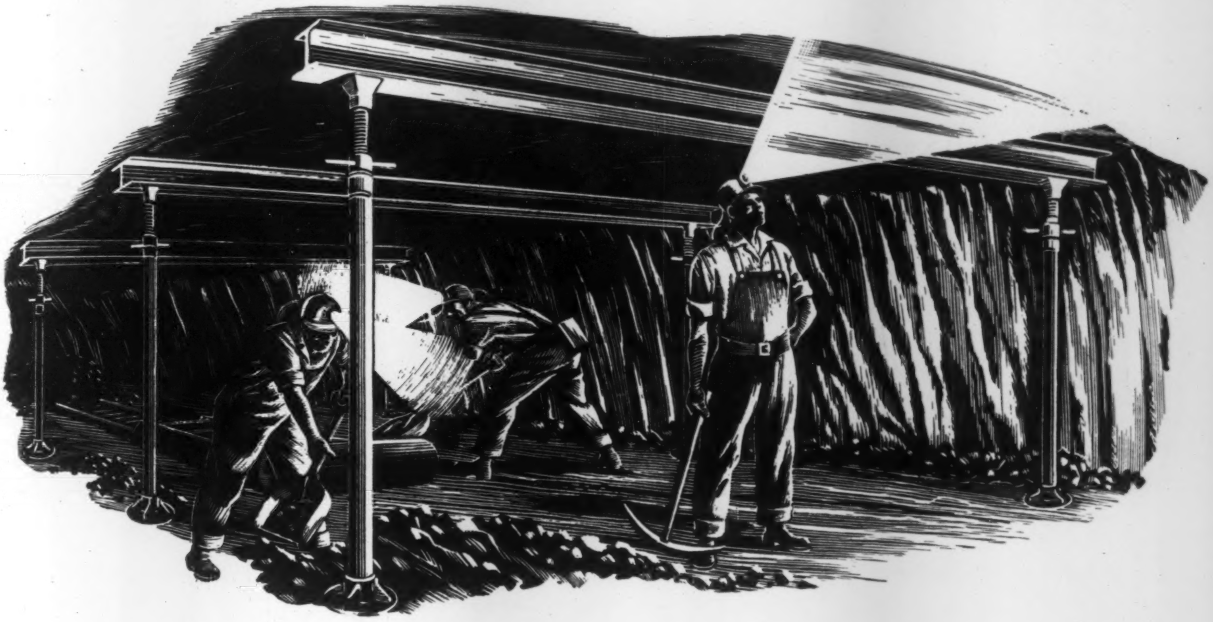

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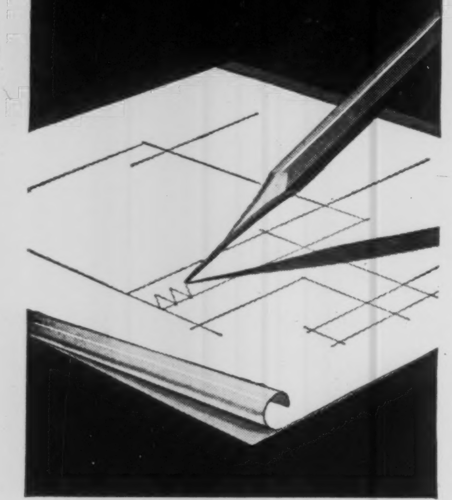

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WATER RESOURCES

MILITARY ENGINEERING. Water Supply in Middle East Campaigns, F. W. Shotton. *Water & Water Eng.*, vol. 49, nos. 602 and 603, May 1946, pp. 218–226, and June, pp. 257–263. Report on geo-hydrological work in connection with water supply in Middle East campaigns, including location of boreholes, record of water issue, and salinity variation; illustrated description of areas where perched water was found above main water table of western desert; data on quality of water.

WATER TREATMENT

ALGAE CONTROL. Pre-Determining Effective Dosage of Copper Sulphate in Algae Control, W. D. Monie. *Water & Sewage Works*, vol. 93, no. 5, May 1946, pp. 173–176. Illustrated description of simple laboratory test by means of which effective dosage of copper sulfate in algae control can be predetermined; discussion of proper method of copper application as used at Canoe Brook reservoir, Summit, N.J.

ANALYSIS, IRON DETERMINATION. Colorimetric Determination of Iron in Water with O-phenanthroline, D. H. Caldwell and R. B. Adams. *Am. Water Works Assn.—J.*, vol. 38, no. 6, June 1946, pp. 727–730. Report on studies; description of reagents and procedure; data on chemical analysis of water samples used in iron test. Bibliography.

COAGULATION. Coagulation with Ferric Sulfate, J. B. Nickel. *Am. Water Works Assn—J.*, vol. 38, no. 6, June 1946, pp. 755–760. Discussion of various coagulants such as ferrous sulfate, ferric chloride, and ferric sulfate; experiences reveal that there is no universal coagulant to date.

FILTRATION. There's Always a Reason, C. E. Olive. *Modern Power & Eng.*, vol. 40, no. 3, Mar. 1946, p. 106. Brief discussion of method devised in small water-filtration plant for proportioning alum feed, providing mean dosage of three grains per gal of water by simple process of dividing incoming water into two streams through fixed orifices; device, designed for plant capable of filtering 45,000 gal per 24 hours, consists of wood water-proportioning tank and alum tank; operating and design details.

IRON AND STEEL PLANTS. Emergency Handling of Steel Plant Water Service, G. E. Stedman. *Steel*, vol. 119, no. 2, July 8, 1946, pp. 122–125. Water supply and treatment equipment at Kaiser plant, Fontana, Calif., described with emphasis on emergency arrangements set up in relation to possible failures in water system.

MODERN METHODS. Modern Methods of Water Treatment, A. J. R. Walter. *Instn. Mech. Engrs.—Proc.*, vol. 153 (War Emergency Issue no. 9), 1945, pp. 282–288, (discussion) 288–293. New crystallization and precipitation processes developed for lime soda softening and entirely new chemical field discovered in hydrogen-ion exchange materials and acid-adsorption materials; development of equipment for production of equivalent of distilled water without heat or evaporation.

RESERVOIRS, GREAT BRITAIN. Biology of Ladyblower Reservoir, R. W. S. Thompson. *Water & Water Eng.*, vol. 49, no. 604, Midsummer 1946, pp. 331–342 (discussion), 343–348, supp plate. Report on biological conditions of reservoir in North Derbyshire, England, during period of first filling, Apr. 1943 to Dec. 1944; description of methods, particulars of reservoir, algae, total bulk of animal and plant life in reservoir; physical, chemical, and biological data presented. Bibliography.

SEAWATER, SALT REMOVAL. Compression Distillation of Sea Water, R. G. Skerrett. *Compressed Air Mag.*, vol. 51, no. 5, May 1946, pp. 123–126. Development of Kleinschmidt vapor-compression portable stills; operating principles; distillation process; compressor equipment; wartime experience in Pacific Island applications.

TREATMENT PLANTS, BISMARCK, N.DAK. Bismarck Disciplines Its Water Supply, W. Yegen. *Am. City*, vol. 61, no. 3, Mar. 1946, pp. 106–107 and 137. Illustrated description of operation of water treatment plant at Bismarck, N. Dak., which succeeded in producing in 21 years of progressive development, pure, clear, palatable, soft and stable water from hard Missouri River water which is disagreeable to sight and taste and at times unfit for human consumption.

TREATMENT PLANTS, OHIO. Water Treatment Problems from Public Health Viewpoint, E. S. Hoyt. *Am. Water Works Assn.—J.*, vol. 38, no. 6, June 1946, pp. 724–726. Discussion of problems of water treatment plants in Ohio in connection with Ohio Department of Health laws concerning plant improvements and settling time.

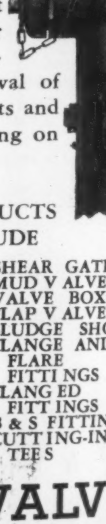
WATER WORKS ENGINEERING

WATER TANKS AND TOWERS. Cylindrical Water Tanks. S. McConnel. *Civ. Eng.* (London), vol. 41, no. 478, Apr. 1946, pp. 142–143. Discussion of cylindrical water tanks and their advantages; examples of tanks of galvanized corrugated iron, bent steel plates, masonry walls, concrete and reinforced concrete, are presented; problem of pre-stressed concrete is included.

HYDRANTS & VALVES

Pipe Line Accessories for Water Works and Sewage Works

VALVES: A.W.W.A. type iron body, bronze mounted with double-disc parallel seat or solid wedge type. Non-rising stem, outside screw and yoke, or with sliding stem and lever. Also furnished hydraulically operated. Square bottom type operates in any position. All rugged and dependable, made of best material with highest quality workmanship.



HYDRANTS: Standard A. W. W. A. type approved by Underwriters and Factory Mutuals. SPECIAL TRAFFIC MODEL is designed to yield at ground line under impact, repair being simply renewal of breakable bolts and breakable coupling on stem.

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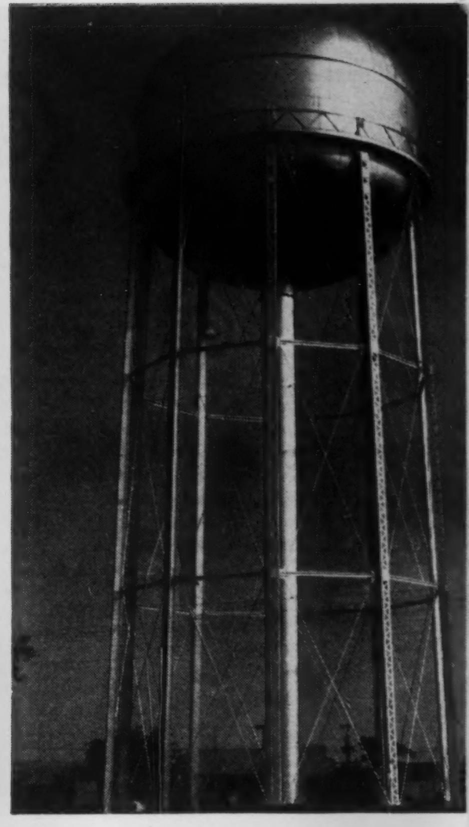

MISSION, Tex.—500,000 gallon double-ellipsoidal tank, 50′ diameter, on 100′ tower.

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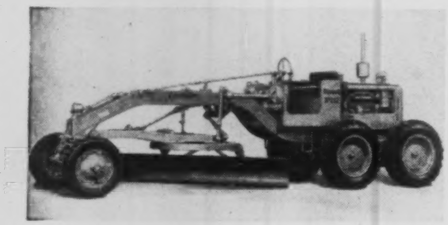
Equipments, Materials and Methods

New Developments of Interest, as Reported by Manufacturers

"Cat" Motor Grader

Production of the "Caterpillar" Diesel No. 212 Motor Grader, suspended during World War II to permit manufacture of products most urgently needed by the Armed Forces, has been resumed by Caterpillar Tractor Co., Peoria, Ill.

Powered by a rear-mounted, 35-brake horsepower, four-cylinder, four-cycle "Caterpillar" diesel engine, the No. 212 Motor Grader is made available in both tandem and single drives. Normally equipped with 10-ft moldboard and leaning front wheels, it has the traction, strength, and blade positions to do a complete range of blade work, and positive-acting, precision made mechanical power controls provide fast, easy operation of all blade and scarifier movements. Smallest of three sizes of "Caterpillar" Series "12" Motor Graders, the No. 212 is built primarily for those whose work requirements do not warrant purchase of the larger models. Specification sheets are available; request Form 1823.



Sand and Gravel Plant

A new standardized, demountable sand and gravel preparation plant is announced by Link-Belt Company, Chicago, Philadelphia, San Francisco, as featuring superior screening and dewatering; using standard units designed for economical dismantling, reassembling and moving to new locations.

The Link-Belt Standardized Demountable sand and gravel preparation plant is described as providing economical operation for a sizable construction or paving job. The equipment of this new plant includes belt conveyors, scrubber, crusher, double-deck vibrating screens, sand dewatering screw conveyor, and the necessary power drive units.

A typical handling system for making one to three finished sizes of gravel and one grade of sand is shown in sketch form in a new 6-page illustrated Folder No. 2170. The stock-piling arrangement can take care of about 6000 tons storage of each size without re-casting.

All units of the structure are sectional, thus providing means for quick dismantling, and moving, without sacrificing efficiency or capacity

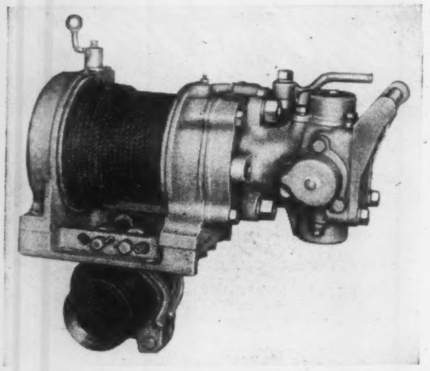
Manufacture of 12-Ton Truck Resumed

Manufacture of the FWD Model M10, which was virtually out of production during the war, is being resumed, according to The Four Wheel Drive Auto Company, Clintonville, Wis. The twelve-ton model will meet the need of highway departments in the snowbelt for a truck with the "drift-busting" qualities of the prewar M10 snow removal truck.

Among the improvements in design on the M10 are the FWD Universal cab, which features a number of comfort and safety advantages, a sturdy streamline radiator grill and improved heavy-duty axles. Engines with higher horsepower rating will be installed in the M10. The standard engine is a gasoline 186-bhp engine with a customer's option on the installation of a 200-bhp diesel engine. The rated gross vehicle weight of the Model M10 is 44,000 lb. While the FWD Model M10 has been placed in snow removal service by most highway departments, the new Model M10 will be marketed as a year-round performer in all types of highway construction and maintenance.

Air-Winch

The Sullivan Division of the Joy Manufacturing Company announces a new, small, lightweight, air-powered hoist, the "Air-Winch," capable of lifting 500 lb yet weighing only 85 lb. It has a rope capacity of 150 ft of $^{1}/_{4}$-in. rope, is only 18 in. long, 9$^{1}/_{2}$ in. high, and 11 in. wide. The "Air-Winch" is powered by a simple, four-cylinder, reversible, piston-type air motor.

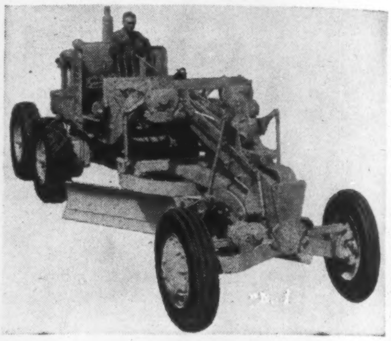


Light enough for one man to move quickly from place to place, the Sullivan AW-80 "Air-Winch" can be mounted in any position on car, timber, column, or bar. Regular equipment includes a set of clamps for column or bar mounting but chains or common drift bolts may be used to secure winch if desired. The control is positive yet sensitive and a conveniently operated brake-lever holds the load firmly and prevents drum from spinning.

High Arch Axle

Featuring a distinctive high arch front axle, three new motor graders have been introduced by the J. D. Adams Manufacturing Co., Indianapolis, Ind. The three models are known as the No. 512 (extra-heavy duty), the No. 414 (heavy duty), and the No. 312 (medium duty). It is claimed that the high arch front axles give greater axle clearance, providing approximately twice the capacity of conventional axles for straddling large windrows, and that bulldozing of axles through material is eliminated.

All three Adams motor graders are powered by International diesel engines, available with cab-controlled push-button starting, and have a range of 8 forward and 2 reverse speeds. The three models are identical in overall design which gives each machine the same wide range of blade positions, adaptability to all types of surface, ditch and bank work and ability to do any work in proportion to its size and power.



Materially improved steering is accomplished by the use of tapered-roller bearings and an entirely new design incorporated in the front axle. Special bulldozers and snow plows have been designed as optical equipment for all three of the new Adams motor graders.

Booster for Controllers

A war time development of Askania Regulator Company, 1603 South Michigan Ave., Chicago, Ill., is an oil-operated hydraulic booster cylinder for air-operated controllers. Using a standard diaphragm top, it provides high power amplification and permits exact positioning of heavy dampers, valves, and the like in accordance with the applied pneumatic loading pressure—usually 0–15 lb per sq in.

The cylinder may be of the crank type, or of the straight reciprocating type. Straight cylinders are available up to 8-in. bore and 30-in. stroke. Other remote positioning cylinders are available using electric instead of pneumatic transmission.

Electrode for Poor Fit-up

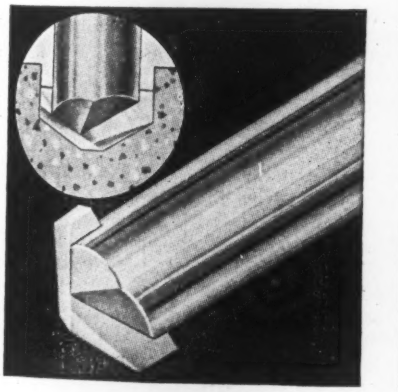
Now available in quantity, the new improved #107 electrode is the result of extensive research in extruded coatings and is a most satisfactory rod for work involving poor fit-up on mild steel. It is especially recommended for single or multiple pass welding on rusty or dirty plates or sections. This versatile, low-cost electrode embraces excellent arc characteristics, working equally as well on d-c straight or reversed polarity as on a-c.

The new improved #107 offers many other advantages. Briefly enumerated, the following points emphasize the outstanding benefits for the operator: Can be used with abnormally high welding current; has exceptionally high deposition rates; permits use of "dragging technique"; excellent appearance of weld deposit is immediately observed; has more forceful arc action; and offers high burn-off rate.

Rod conforms to the E-6012 classification of the A.W.S. Specification A233-45T and is marked in accordance with N.E.M.A. standards. Additional information concerning this new development is available. Wilson Welder and Metals Co., Inc., 60 East 42nd St., New York 17, N.Y.

Drills for Masonry

Kennametal Inc., Latrobe, Pa., is producing a line of Kennadrills for rotary drilling in concrete, brick, slate, marble, limestone, plaster, glazed tile, asbestos, and other non-metallic construction materials. These drills have cutting tips of Kennametal, the cemented carbide that is harder than tool steel, highly resistant to abrasion, and unusually strong. Because of Kennametal's strength it has been possible to design the drill so that the tip extends beyond the diameter of the shank, thereby providing generous annular clearance space around the shank for cuttings. This minimizes the possibility of binding, since the "turbine action" of the drill continuously and smoothly ejects cuttings from the hole.



Any rotary type of drill can be used to operate Kennadrills. Nine sizes are available: 1/4, 5/16, 3/8, and 1/2 in. and 1/4-in. capacity drills; and 1/2, 5/8, 3/4, 7/8, and 1 in. for 1/2-in. capacity heavy duty drills. Leaflet 46-5.

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WOLMANIZED LUMBER*

For built-in protection in artificially humidified buildings, or where industrial processes create steam and vapor, there's the place to use Wolmanized Lumber. This lumber, impregnated with Wolman Salts* preservative by pressure treatment, will give you many more years of service where rot-producing moisture is present.

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DRIVES PROTECTION DEEP

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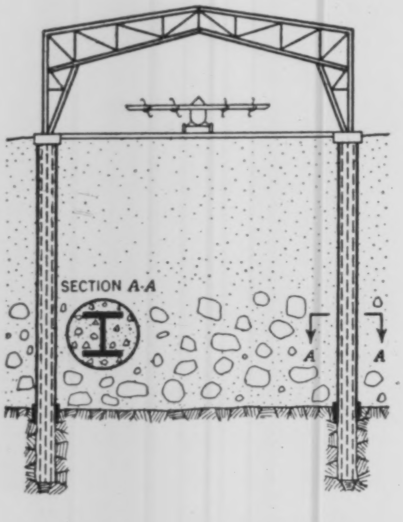

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In the new model polariscope of 4¼" clear aperture, the parallel beam is collected by a rear element and condensed through a three component lens of the Cooke system. In the new larger unit (8¼" aperture) a four component lens of the Omnar system is used. *The image is sharp throughout the field, free of aberration, astigmatism and distortion.*

Literature of new model polariscope now available

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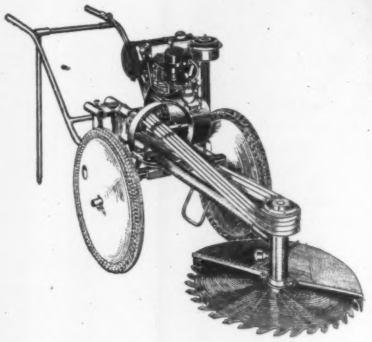
Portable Circular Saw

THE LOWTHER C-SAW, manufactured by the Harry A. Lowther Company of 141 West Jackson Boulevard, Chicago, Ill., has a balanced frame of electrically welded tubular steel. Either semi-pneumatic or full-pneumatic tires are supplied on the two 26-in. disk-type, welded steel wheels. By a simple adjustment of the wheels, the machine can be lowered or heightened so that it will cut even with the ground or as high as three feet off the ground.

Tapered roller bearings and improved grease seals are used in the saw mandrel.

An important feature is the patented "constant-centered" drive, which makes it possible to quickly and easily rotate the saw arm and blade to the desired angle for bucking or felling. No tools or change-over are required. Regardless of cutting position, all 4 V-Belts are in perfect alinement and full power is transmitted to the mandrel pulley. Power is supplied by a 6 h.p., 4-cycle air-cooled gasoline engine.



A 30-in. circular saw with a 1⅜ in. arbor hole is generally used. Although any standard blade can be used, the Lowther Company has designed a special blade that is recommended for cutting pulpwood. In felling and bucking trees, the same general technique is employed as with a two-man cross-cut saw. However, the cutting action is many times faster.

The machine is light in weight and is easy to handle under most all conditions.

25-Ton Jack

A NEW SIMPLEX Ball Bearing Bridge and Industrial Jack designed for heavy-duty lifting, lowering and supporting has been introduced by Templeton, Kenly & Co., 1020 S. Central Ave., Chicago 44, Ill. This Jack, Simplex No. 2522, has a capacity of 25 tons and will lift a maximum height of 10¼ in., yet it weighs only 140 lb. Lifts high or low work to full rated capacity on corrugated top cap which is 22 in. above ground level or on 10-in. square toe lift which is only 4⅜ in. above ground level.

Greater clearance above ground for easier operation because fully enclosed, dirt-proof ratchet and elevating mechanism are at top of Jack instead of in base as in Journal Jacks. Speedy, smooth, safe operation assured by chrome-molybdenum steel thrust bearings; heat-treated seamless alloy steel elevating sleeve, alloy steel lifting screw, forged alloy steel gears. Catalog No. 45.

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—Seldom does an industrial product enjoy such dominating preference as is accorded to Layne Well Water Systems by Marion City and Factory executives. Such preference was earned through recognized reputation of superior quality and basically sound operation economy.

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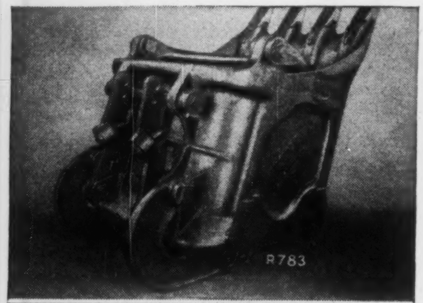
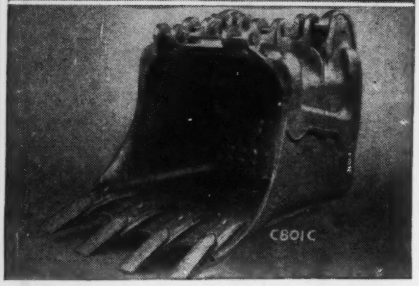
Manganese Steel Dippers

To meet demands for a dipper with optimum durability and over-all weight, the American Manganese Steel Division of the American Brake Shoe Co., Chicago Heights, Ill., has introduced the Amsco All-Manganese Steel Welded Type Dipper. When fitted with a door and bail of adequately strong design, this dipper is somewhat lighter in weight than the Amsco patented Renewable Lip Dipper. If made with a lightly constructed door and hinges, it will not exceed the weight of any strong, composite-type fabricated dipper. The dipper illustrated has the advantage of having a manganese steel body welded into an operating unit.





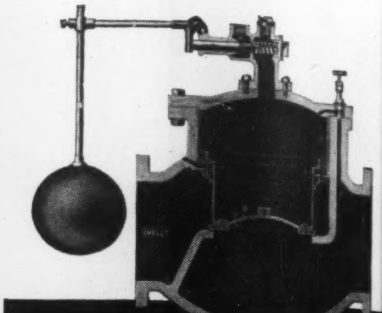
The important factors of design in a power shovel dipper are those that contribute to fast, efficient digging, full loading, quick dumping and long bucket life. All of these factors were taken into account in designing the Amsco All-Manganese Steel Welded Type Dipper. The body of this all-manganese steel dipper is as strong and homogeneous as if made in one piece. At the same time it is possible to remove a worn front and reweld in place a new one without destroying the back.

The Amsco all-manganese steel welded type dipper is made in capacities of $^3/_4$ cu yd and up. Sizes $^3/_4$ yd to 2 yd are made in two body pieces, front and back. Sizes over 2 yd are made in four pieces; front, back, and two side plates.

Rod Selector Chart

A new Rod Selector Chart has been developed by the Eutectic Welding Alloys Corporation, 40 Worth St., New York 13, N.Y.

This chart lists the company's products and their suggested applications; gives the bonding and remelting temperature for each alloy as well as the Brinell hardness; and features the strength in psi of these "Low Temperature" Welding Alloys.



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Available in standard sizes from 3 inch to 36 inch, in Angle and Globe Patterns—iron, semi-steel, and cast steel bodies with non-corrosive trim of bronze, Gav-alloy or Stainless steel.

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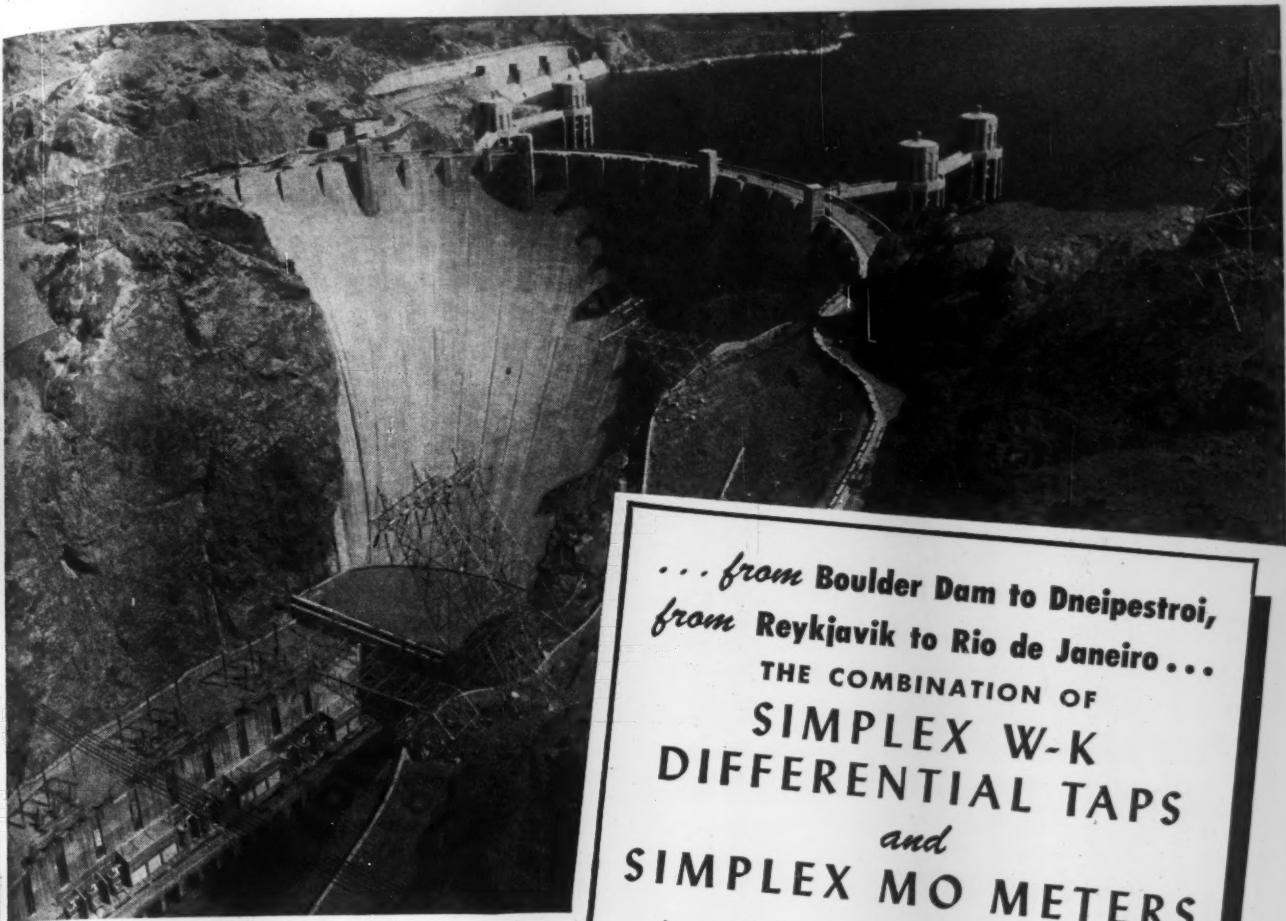

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. . . from **Boulder Dam to Dneipestroi,**
from **Reykjavik to Rio de Janeiro . . .**
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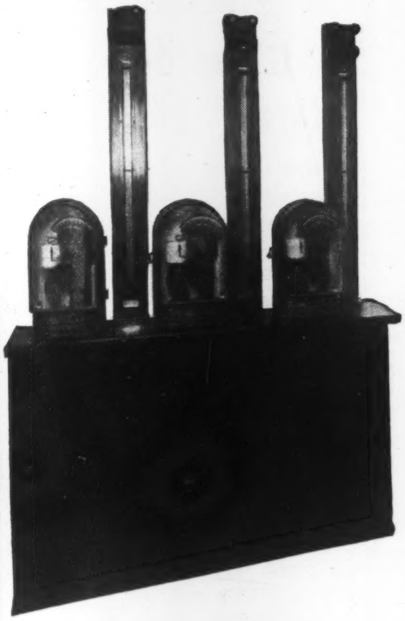
is providing Hydro Plants with accurate, reliable, and economical Turbine Flow Measurement.



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In addition to the installations listed above, this form of SIMPLEX Metering Equipment has a distinguished record of satisfactory service in numerous other hydroelectric plants over a period of many years.

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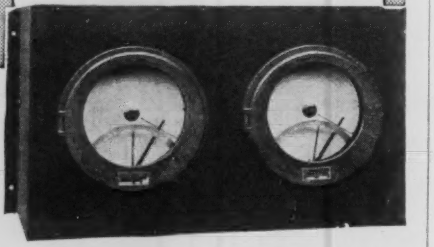
Type B
RECORDER

...does 3 jobs well

- *Records and indicates head or flow.*
- *Totalizes flow.*



The user list of Stevens *Type B* Recorder reads like a Blue Book. Reason—the instrument is particularly adapted to waterworks, sewerage and industrial applications—and is equally suitable to any class of recorder service.

Type B is really *triplets.* It records and indicates either head or rate of flow and registers total volume passed in any elapsed time.

Circular charts are used and may be had for daily or weekly operation.

The *Type B* is direct float operated or remotely controlled. Quality 8-day or electric clock is standard equipment. The recorder can be mounted on wall, pedestal, panel, or in sewer manhole. It can be hermetically sealed against corrosive fumes.

Want more information about this 3-way wonder? Write for Bulletin 25.

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Literature Available

ASPHALT PLANT—A six-page bulletin, AP-F1, announcing a new portable asphalt mixing plant, the Model F, has been issued by Iowa Manufacturing Company, Cedar Rapids, Iowa. This new plant is a batch type with a capacity of 25 cu ft and will handle either hot or cold mixes. It is mounted on pneumatic tires for easy portability, and can be set up ready for operation in a very few hours. The bulletin is complete with flow-sheet, detailed specifications, and dimensions.

BALL BEARING MANUAL—The third book in the series of technical treatises on ball bearings for designers and engineers has just been issued by the Engineering Department of New Departure, Division of General Motors Corporation, Bristol, Conn. Part III covers enclosure and lubrication for all operating conditions. Parts I and II deal with principal bearing types and fundamentals of mounting practice—and describe details of shaft and housing designs so important to good ball bearing performance. Either or all three of the above books are available.

CLAY PIPE—The Clay Sewer Pipe Association, Inc., 1105 Huntington Bank Building, Columbus 15, Ohio, has published a bulletin illustrating the architectural uses of clay pipe and allied products in connection with residential uses and construction.

CORROSION CONTROL—A 16-page booklet—"Corrosion Control in Air Conditioning; The Chromate Treatment of Their Water Systems"—is available from the Mutual Chemical Company of America, 270 Madison Ave., New York 16, N.Y. The booklet explains how to employ chromate to the best advantage in various central systems of unit air conditioners. The huge amounts of water required by air conditioning equipment for washing, cooling, and condensing purposes create serious economic problems in many localities. High water cost usually requires the installation of recirculating systems to save water, and the use of chromate to save the systems.

ELECTRICAL PRODUCTS—A 16-page letter-size briefed handbook of electrical products, B 6452, suitable for a wide variety of industries, has just been announced by the Allis-Chalmers Mfg. Co., 655, Milwaukee 1, Wis. Well illustrated, the handbook describes eight classifications of electrical equipment including: a-c and d-c motors of $^{1}/_{2}$ to 50,000 hp; motor control equipment; multiple V-belt drives of constant and variable speeds; low and high voltage transformers, switchboards, switchgear and circuit breakers; equipment for power generation; centrifugal pumps; and also appearing in the booklet is information on Allis-Chalmers welding equipment and arc welding accessories.

DIESEL-POWER EARTHMOVERS—A tribute to the versatility of diesel power, and a word and picture portrayal of a wide variety of its uses, are contained in the 16-page color booklet, Form 9547, by Caterpillar Tractor Co., Peoria 8, Ill. Titled "When Its Power You Need," this booklet covers all phases of earthmoving.

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MOTOR GENERATORS—The generators and motor generator sets, both alternating and direct current, of Century Electric Co., St. Louis 3, Mo., are illustrated and described in booklet, Form 646. These sets are recommended for the production of electricity for light and power in capacities from 50 watts to 200 kilowatts.

PREFORMED WIRE ROPE—A book published by the Preformed Wire Rope Information Bureau, 520 N. Michigan Ave., Chicago 11, Ill., capably answers the elementary question: "What is preformed wire rope?" Well illustrated, and in three colors, this book tells the story of the development of preformed wire rope and what that development has meant to industry. In non-technical language it tells what the preforming process does to the wires in a rope and what effect it has on the rope's final service.

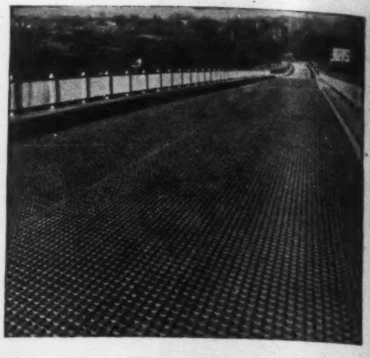
PUMPS—Catalog D-446 covers Type ES, small, high-pressure pumps, for pressures up to 200 lb per sq in., as manufactured by Economy Pumps, Inc., Hamilton, Ohio. Standard vertical ball bearing motors are used, and, it is stated, changes in capacity cause only very slight changes in pressure, thus affording remarkably even head control with this pump.

SHEATHING—A new publication, "New Water-Repellent Gypsum Sheathing," contains information on the advantages of water-repellent gypsum sheathing—its fire resistance, water repellence, structural strength, durability, economy, and wind-tightness. Specifications for the erection of water-repellent gypsum sheathing and details showing the application of brick veneer, wood siding, asbestos cement siding or shingles and stucco over gypsum sheathing are included. Gypsum Association, 211 W. Wacker Drive, Chicago 6, Ill.

THICKENERS AND CLARIFIERS—Thickening, clarifying, and agitating equipment are covered in a 16-page bulletin, No. 31-D, issued by the Hardinge Co., Inc., York, Pa. The catalog covers tray thickeners, "Auto-Raise" Thickeners, Rectangular Clarifiers, Circular Clarifiers, Agitators, Hydro Classifiers, Hydro Separators, Counter-Current Classifiers, and Automatic Backwash Sand Filters. Two tables give data on specific thickening and clarifying operations.

TRACTOR—The Allis-Chalmers Tractor Division of the Allis Chalmers Mfg. Co., Milwaukee 1, Wis., released a 32-page catalog, MS-248A, on its HD-14 Diesel "crawler" tractor. Photos of the tractor in action plus cutaway views of important parts are included. Special pages are devoted to allied equipment, auxiliary attachments and specifications, describing the HD-14's 132 drawbar horsepower, its six speeds forward and two reverse, engine data, general tractor dimensions, steering details, and fuel capacities.

WINDOWS—A new 40-page catalog, No. 16E, covers in complete detail the many types of metal windows offered by The William Bayley Co., Springfield, Ohio. Construction details, specifications, and dimensions are given.



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